Agony and Ecstasy

by

Maurice B. Gardner

In my boyhood it was ecstasy to read an Edgar Rice Burroughs serial in weekly installments, but the agony of having to wait an entire month for each installment was heart-breaking. It would have been asking too much to have each of the author's stories appear in a single magazine issue, though upon several occasions the readers were so favored.

I was too young to follow those early serials in the old All Story and New Story monthly magazines, which presented "Under the Moons of Mars," "The Gods of Mars," "The Cave Girl," "The Warlord of Mars," "The Return of Tarzan," and "The Outlaw of Torn." How fortunate it must have been for those senior readers when the old All Story became a weekly in March, 1914, with the serials of Edgar Rice Burroughs appearing almost exclusively in its pages. Back in those days, what relief it must have been, after reading "The Warlord of Mars" in four monthly installments, to have to wait only a week to continue that excellent four-part serial, "At the Earth's Core." Patience would have been strained to the breaking point had one been compelled to wait an entire month to obtain the next installment of that particular fine novel, which appeared in the four April issues of All Story weekly.

I might add similar sentiments in regards to the abbreviated version of "The Beasts of Tarzan," and "The Mucker," following later in the year. Then in 1915 we had "Sweetheart Primeval," "Pellucidar," "Barney Custer of Beatrice," and "The Son of Tarzan." In 1916, there was the three-part serial, "Thuvia, Maid of Mars," "The Return of the Mucker" in five parts, "The Girl From Farris's" (four parts), and last, the abbreviated version of "Tarzan and the Jewels of Opar" in five parts. In 1917, All Story weekly featured "The Cave Man" in four parts, and "The Lad and the Lion" in three parts.

The one instance of a Burroughs serial being printed complete within a week's time was when "Ben, King of Beasts" appeared in the Evening World daily magazine, as "The Man-Eater," from November 20th to 25th, 1915, inclusively. What a blessing it must have been, to await only the passing of a day to resume reading an ERB serial! This short novel, incidentally, was the only Burroughs story to make an original newspaper appearance. Many others, however, appeared in newspapers after magazine and book publication.

How "Beyond Thirty," a short novel, managed to find its way into All Around magazine in the early part of 1916 has always been a mystery to me. This story, incidentally, at the request of this writer, was serialized in two parts in the Boston Sunday Globe magazine section in the early part of 1929.

The several serials that appeared in All Story weekly during 1916 and 1917, while "New Stories of Tarzan" were being featured in Blue Book magazine, had been written previously and were being doled out in this manner to keep the readers from deserting the folds of All Story.

Early in 1918 Blue Book published in one issue a short novel titled "The Oakdale Affair"; but later in the year, the agony of five months had to be endured while the reader followed the three short novels comprising the book, "The Land That Time Forgot." In December, All Story weekly featured "H.R.H. the Rider" in three parts.

The following year Red Book magazine published the six monthly installments of the first half of the book "Tarzan the Untamed." It must have been agonizing indeed to wait half a year to follow Tarzan's warfare against the Huns in darkest Africa. What a relief the following spring, to read the five weekly installments of the second half of the book, titled "Tarzan and the Valley of Luna," in Argosy-All Story weekly. The next year, one's ecstasy must have been boundless to read "Tarzan the Terrible" in seven weekly installments, in the same magazine. That same autumn, in the four issues for October, it must have been pleasant to read "The Efficiency Expert." Beginning in February, 1922, and continuing for seven weeks, the readers were privileged to enjoy "The Chessmen of Mars" in the same magazine. Beginning with the June issue of Munsey's, "The Girl From Hollywood" ran for six issues that must have seemed like an eternity. But in December of the same year, what a relief to follow "Tarzan and the Golden Lion" through seven issues of Argosy-All Story weekly.

In the spring of 1923 the first segment of the fine trilogy, "The Moon Maid", appeared in the weekly magazine; but it was not until February, 1925, that the second part, a four-part serial titled "The Moon Men," appeared, and in September the third segment, "The Red Hawk." Altogether this trilogy was featured in twelve installments; and were it not for drastic excerptions in the second segment, and minor ones in the third, this book unquestionably would have been the author's lengthiest.

The year 1926 saw the seven-part "Tarzan and the Ant Men" in the early spring issues of Argosy-All Story, while early autumn presented the unforgettable "The Bandit of Hell's Bend" in six installments. Had this fine western story been written several years earlier, it might well have been a starring vehicle for William S. Hart, who could have portrayed the part of "Bull" to perfection.

Although no stories by ERB were serialized in 1926, the following year saw "The War Chief" featured in Argosy-All Story through five issues in the spring. "The Master Mind of Mars" appeared complete---what a blessing!---in Amazing Stories Annual. In October, "The Tarzan Twins" appeared as a beautifully illustrated Volland book. The December issue of Blue Book magazine arrested my attention with the fact that a new Tarzan serial was commencing in that issue. Need I mention the agony of having to wait an entire month before reading the next episode, and those that followed, until "Tarzan, Lord of the Jungle" was concluded? A week was long enough between installments, but a month seemed like an eternity.

What a relief it was to read "The Apache Devil" in Argosy-All Story and only have to wait six weeks to complete it, after the six long months that were required for the Tarzan novel.

The following four years of seemingly unending eternities managed to pass their weary way while Blue Book featured "Tarzan and the Lost Empire," "Tanar of Pellucidar," "Tarzan at the Earth's Core," "A Fighting Man of Mars," "Tarzan, Guard of the Jungle," "The Land of Hidden Men," and "The Triumph of Tarzan."

Fortunately, at this juncture the editor of Argosy managed to lure the famous author back into the fold, and we only had to wait a week between installments of such serials as "Tarzan and the City of Gold" and "The Pirates of Venus," both in six parts. While the latter story was being serialized, Blue Book presented "Tarzan and the Leopard Men" in the late months of 1932 and the January, 1933, issue. A couple of months later "Lost on Venus" appeared in Argosy as a seven-part serial.

Liberty magazine favored the author's followers with weekly installments of "Tarzan and the Lion Man" later in the year, and into 1934.

Late in 1934 and into the spring of 1936, with a six month interim, Blue Book presented "Swords of Mars" and "Tarzan and the Immortal Men" -- more eternities, it seemed, before the two serials were completed. Later in 1936 Whitman issued a Big-Big illustrated book with the title, "Tarzan, the Twins, and Jad-Bal-Ja," which was a sequel to "The Tarzan Twins."

The reader only waited three weeks to follow "Tarzan and the Magic-Men" in Argosy, but three months had to pass to read its sequel in Blue Book, "Tarzan and the Elephant Men." These two stories were later published in book form under the title "Tarzan the Magnificent." Seven weeks were to pass in 1937 to read "Seven Worlds to Conquer" in Argosy. "The Resurrection of Jimber-Jaw" followed in a single issue.

From January 8th, 1938, until the February 12th issue of Argosy, readers were favored with three ERB novels. "Carson of Venus" was first, followed shortly by "The Red Star of Tarzan" (book title: "Tarzan and the Forbidden City" -- a much different version from the magazine serial), and "The Synthetic Men of Mars." In the July issue of Fantastic Adventures, "The Scientists' Revolt" appeared, written some years previously.

"The Terrible Tenderfoot" was a monthly three-part serial in Thrilling Adventures, followed by a complete novelette, "Tarzan and the Jungle Murders." At about the same time, Blue Book magazine featured a short Tarzan story, "Tarzan and the Champion."

It was at this juncture that Amazing Stories printed "John Carter and the Giant of Mars" in the January, 1941, issue. This story was the subject of heated discussion as to its true author. Much later it was revealed as a co-production of Mr. Burroughs and his son, John. During this year and the following one, Amazing Stories and Fantastic Adventures were to print novelettes of Mars, Venus, and Pellucidar, which later were published in book form.

During this same period, Argosy featured a serial, "The Quest of Tarzan," which was a different version of the book, "Tarzan and the Castaways" (the story's original title).

"Beyond the Farthest Star" appeared complete in the January 1942 issue of Blue Book. The last magazine appearance of an ERB novelette was in the February, 1943, issue of Amazing Stories, and was titled, "The Skeleton Men of Jupiter." This evidently was to be the first segment of a new John Carter novel, but no others were written.

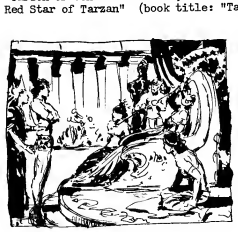
The new Edgar Rice Burroughs devotees of the last couple of decades have been spared the agony of waiting endless weeks and months from the beginning to the completion of the author's various serials in magazines. How fortunate I was when I purchased those early books of the famous ape-man, and the Martian series! I had been spared the long months that must have dragged so slowly, had I been of an age to read "Under the Moons of Mars," a six-part serial, and "The Return of Tarzan" in seven parts in New Story magazine. "The Gods of Mars" was in five parts, "The Cave Girl" in only three, and "The Outlaw of Torn" again in five.

How wonderful it must have been to read "Tarzan of the Apes," complete, in that October, 1912, issue, and "A Man Without a Soul" (book title: "The Monster Men") in one issue of the old All Story magazine. Then there were "The Eternal Lover" and "The Mad King" in the 1914 weekly.

In later years, how welcome it was to read "Land of Terror," "Tarzan and the 'Foreign Legion'," and "Tarzan and the Madman" immediately in book form.

Yet, now the agony of passing months, extending into years, must be endured before the unpublished stories unearthed in the vault at Tarzana will see the light of the printed page.

Why, oh why, must there be this delay?



The Misadventures of TARZAN HENRY

by Gabe Essoe

Preparations for the last scene to be shot were quickly made. Everything became silent. On cue, three large-size Brazilian natives, as though triggered from the starting gate at Hollywood Park, raced for a powerfully built white man. Gritting his teeth in anticipation, his whole body tightened. This was ex-Ram, Mike Henry, star of TARZAN AND THE JUNGLE BOY.

Within seconds they were upon him. Sweat and strain showed on their faces as they struggled. Suddenly, with a tremendous body block, that was reminiscent of Ram defensive action, Tarzan Henry eliminated one native. He quickly finished the other two, each in turn; one with a cat-like blow to the throat and the other with a knee in the back and a side-arm smash to the head. Then with a sigh of relief, Tarzan rounded up the Jungle Boy and they walked back toward the village.

With that scene TARZAN AND THE JUNGLE BOY was finished. And in the bargain, so was Henry's career as Tarzan. He laid down his loin cloth and left the jungles for the last time.

It had only been 12 months since Mike Henry was chosen to portray Edgar Rice Burroughs' famed apeman. Proudly, the producer of the Tarzan films, Sy Weintraub, announced the end of his search. Weintraub had been testing actors and athletes of a wide variety since Jock Mahoney, Mike's predecessor, had vacated the role. Big sports names such as Frank Gifford, New York Giants half-back, had been eyed, but not given an option on the loin cloth.

Henry's physical prowess made him the ideal choice. As star linebacker for the Los Angeles Rams, he looked more like a steam roller than the average guy on the street. His 228 pounds were distributed over his impressive 6ft. 3" frame as though by the hands of Michaelangelo.

An avid Ram fan, Weintraub had seen Mike play many times. Then by chance, he caught a TV special called "A Day in the Life of a Ram." Mike was one of the players featured on the show. Weintraub liked Mike's moves. He also noticed that Mike's rugged good looks bear an incredible resemblance to the cartoon artist's conception of the jungle hero. After the show, he called Mike's agent and set up an appointment.

"The next thing you know," Mike said, "we're in his office talking deals. We did a screen test. It turned out real good and we drew up the papers."

Mike signed a seven-year contract with Weintraub, who is interested in reshaping Tarzan's image. "The majority of the people have the wrong idea about Tarzan," he contends. "Burroughs didn't create him as a superhuman white savage who has to think his words over one by one before saying them. This is the image we want to change." Weintraub cut Tarzan's character to the bone and redressed it according to Burroughs' recipe.

Part of this rehashing of the apeman's vitals was undertaken with Jock Mahoney. As Tarzan, he spoke good English and had an educated air about him. But while making his second jungle epic, TARZAN'S THREE CHALLENGES, in Thailand, he caught jungle fever. Jock lost 35-lbs. before the picture was completed. At 42, Jock was the oldest actor to play Tarzan. (Ad-lib: P. Dempsey Tabler was older and John Weissmuller was 45 when he made his last Tarzan pic.) He was also the tallest, being 6'6", and before his stint as the apeman was over, he was also the skinniest.

Henry, on the contrary, was overweight. He had to lose 20-lbs. from his legs and waist, accenting the definition of his excellent physique. With his new slimness at 208-lbs., the "new image" was refined to secret agent perfection. In his first movie, TARZAN AND THE VALLEY OF GOLD, Mike is a pseudo-James Bondian spy chaser. He is a gentleman ape in a Brooks Brothers suit who is at home in a Paris night-club as he is in a treehouse. Tarzan-Bond even guns it out with the baddies in the Plaza de Toros in Mexico City.

VALLEY OF GOLD was shot between the end of football season and the beginning of spring practice. The movie company carted camera, crew and cast down to Mexico for ten weeks. Most of the action was filmed in the capital city and the surrounding lowland jungles.

Faithful to spy movies, there was a beautiful starlet co-starred with Mike for intrigue and romance. Well-proportioned Nancy Kovak plays the captive companion of the criminal ringleader. Miss Kovak is more than adequate replacement for the wholesome Jane. She and Boy have long been gathering dust on the cutting room floor. There is no place for them in Tarzan's modern world.

Tarzan's world has changed so radically that in one scene Henry drives a tank through the underbrush in pursuit of the villains. In order for them to get away, they have to blow the tank up. Tarzan, sensing their plan, fires on them. But somehow the explosive in the turret backfired into the cab where Tarzan was, burning his face and chest. While still swatting sparks, he had to sit tight. There was no jumping out of the cab for another charge was set to go off underneath the tank. After the explosion finished rocking him, Tarzan Henry emerged with a burned expression.

Suntanned and hairless of chest and face, Mike returned to Los Angeles for spring training. This was to be his last spring session. His seven tough, good years in the violent world of pro-football ended in July when he turned in his resignation to the then Ram coach, Harland Svare, who hated to see him go. But Weintraub wanted him retired from the sports scene. He felt that football was going to conflict with his plans for the grid star. Mike was to complete another feature film and then start work on a TV series which Weintraub had already sold to NBC.

In late August, Mike and company were on their way to Rio de Janeiro, Brazil, to shoot TARZAN AND THE GREAT RIVER. This, like the first film, was to be shot entirely on location. Producer Weintraub prides himself on this. He feels that this technique of filming on location is something he's given to the industry. This way the high costs of a domestic studio can be avoided.

This method has certain drawbacks. Everything must be shot silent and then post-dubbed. That is, all the sound is added later. In working with animals, the trainers yell out commands during the filming. Birds, planes overhead, and local inhabitants are all troublesome to the sound man. The only way to eliminate all interference is to post-dub.

"Most of the animals used in the picture were flown in. The one most fascinated the Brazilians most was the 500-lb. trained lion, Major," Mike said, "They would crowd around him and point and exclaim, 'Leon!'"

The lion, in addition to being the number one attraction, was a continued source of headaches. While shooting a scene in a downtown Rio public park, Major escaped. He raced through the streets with Mike hot on his tail. Before it struck Major to play games with the scrambling pedestrians, Mike caught and returned him. "It wasn't time for his break yet," Mike explained.

Things didn't always go as smoothly. In one scene, the lion, friendly to Tarzan, attacks some unfriendly natives. Major took the attack to heart and began munching on one native's foot. It made for a realistic shot but a little unpleasant.

"None of the animals were de-clawed or detoothed," Mike said. "And it was dangerous working with them because wild animals are never really tame. They could attack you at any moment. A lion could take off a man's leg or arm with one blow. As Major almost did."

Asked if they drugged the animals before takes, Mike replied, "They should have given us drugs. We were all taking chances. Animals are so unpredictable."

Extremely unpredictable as Mike found out. Working with the chimp, Mike earned scars to prove it. In an intimate close-up, the chimp was to kiss Tarzan on the cheek. Instead, after Mike had the 60-lb. chimp in his arms, it ripped open his jaw with its teeth. It took 18 stitches to put Tarzan's jaw back together.

That was not the worst of it. As a result of the bite, Mike lay in a coma for three or four days, "with monkey-fever." He was unable to work for three weeks.

"They had to rewrite the script and shoot around me while I recovered. The chimp had to be destoyed. Once an animal turns on a man, it can't be trusted again. What happened was apparently a matter of association. You see, in my first picture in Mexico the chimp gets wounded and I run over and rescue him. While I'm racing up these huge stone steps with the chimp in my arms, there are explosions and gunfire. It must have scared the hell out of him. Then when I picked him up again in Brazil, he equated me with the explosions and sank his teeth into me."

Co-starred with Mike in TARZAN AND THE GREAT RIVER is comedian Jan Murray, former Olympic star, Rafer Johnson, and lovely Diana Millay. Jan plays a river boat captain; Rafer supplies the villainy; and Miss Millay is cast as the Florence Nightingale of the Rio.

The picture was a unique experience for Jan Murray who is frightened by his own minature poodle. In a key scene, he is supposed to fall into the river with a crocodile; Tarzan then rescues him. Jan balked. He wasn't going for it.

"Go ahead. Jump in!" the director called. "He's trained."

"Trained to do what?" Murray called back.

"We don't know," the director shrugged, "It's his first day here."

The take, however, went easily once Jan was in the water. Tarzan Henry pulled him out before, as Jan put it, "that overgrown lizard could get at me."

As the villain, Rafer gets his comeuppance at the end. He and Henry stage a terrific fight scene. Both excellent athletes, they did all the stunts themselves throughout the whole picture. Their fatal struggle begins on a ramp above the cascades that rush down to the river. Moments are tense when a fall would mean certain death. Then a quick-paced chase down the ramp to the landing on the riverbank and into the water. Then back out of the water, they wrestle over to a huge bonfire (it takes place at night). In a violent moment the struggle is over. Tarzan picks up Rafer and throws him into the raging fire.

Blood of both men added to the realism of this scene. Once finished, however, it was censored. It was felt that the brutal death of Rafer in the film would be interpretted as being anti-Negro.

In the final version of the same scene, Tarzan finishes Rafer in the river. This was less objectionable. Even in the watered-down version. the fight is probably the most exciting part of the film.

With the picture finished Mike was anxious to get home and rest up for the series which was due to start in February. But it was decided to squeeze in another feature in the time remaining. They had been on a 7 day week working schedule fairly consistently, but now they would have to work even harder. The strain became greater.

Besides Mike's illness from the monkey bite, there were other small problems that plagued him. He had food poisoning four times. In the Brazilian heat, food spoils rapidly. He was also waging a sometimes losing battle against diarrhea. This posed a problem, for restrooms were few and far between. When he wasn't fighting diarrhea, he was swatting mosquitos. He later contracted an ear infection which served a purpose. It hurt like hell and took his mind off the insects and heat.

After a quick trip home in early December, Mike sped back to Brazil. There was a deadline that had to be met. A few weeks after his return, it began to rain heavily. The company heroically shot on and sometimes literally had to fight the elements for each precious foot of film they got.

It rained torturously for two weeks. The city's drainage system was unable to handle the excessive rainfall. The riverbanks swelled and overflowed. The rains brought the worst floods Rio had experienced in nearly a century. It will take five years to get the city back into shape. The floods broke the water mains and all the running water in the buildings stopped. In the meantime, to take a bath, you had to order buckets of rain water. It was the only thing available with the water mains gone and the river and ocean polluted.

Film production ceased. To add to the situation, a typhoid epidemic broke. Fortunately, it was squelched within a few days. The environment wasn't really condusive to Mike's convalescing health.

As soon as the rains permitted, they were back at work. After all, they were there to make pictures. And gutsy Mike looks like he couldn't be overworked or sick if he wanted.

The rains had put them way behind schedule. Time was of the essence because of the TV commitment. They feverishly shot from dawn to dusk. Because the weather had held up produc-

tion, there could be no break between the feature and the series. They would have to continue at the same pace.

Before this third feature, TARZAN AND THE JUNGLE BOY, was completed, Mike told Weintraub that he was turning down the lead in the T V series. He was tired and his weakened health nagged him. Mike finished the feature and left for home. Weintraub told the press that Mike was "spooked from having spent too much time in the jungle."

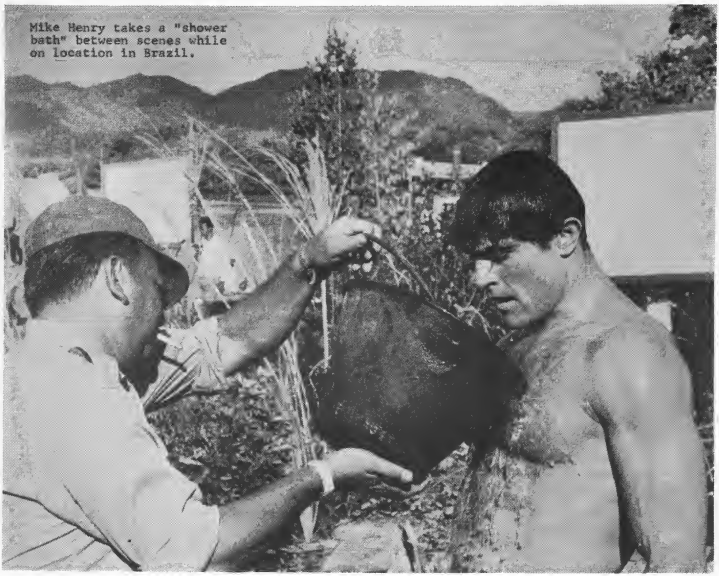
Even before JUNGLE BOY was finished, production on the TV series began. It is an hour-long show in color, shot entirely on location in Brazil. (Ad-lib: Tarzan & company has since returned to Mexico.) The format vaguely resembles the now defunct RIN-TIN-TIN series with a few minor changes: a native village instead of a fort; natives instead of Indians; Cheta, the chimp, running RInty's errands; a jungle boy replacing Rusty; with Tarzan as a sort of commander-in-chief.

Henry's replacement for Tarzan is 212-lb., 6' 4" Ron Ely. In Physical appearance, he strongly resembles Mike. This may have been the reason for the choice. Ron is a veteran of another TV show. He co-starred on THE AQUANAUTS a few years ago.

As far as Mike is concerned, Ron is welcome to the part. Perhaps Ron will be more lucky, perhaps not. Already he has burned his hand and fore-arm in a scene.(Ad-lib: He has since been bitten and clawed by both lion and leopard, sprained an ankle, and broke a shoulder when he missed a vine-swing. The latter injury was caught on film and has been seen at least three times on the TV program.)

The scars, bruises and burns are part of the hazard of the strenuous role. Of the previous actors who have portrayed the screen Tarzan, none managed to get away unmarred: one was mauled by a lion; the son of Tarzan was crushed by an elephant; one broke his leg and quit; another broke his shoulder; still another badly blistered his feet; all were type-cast.

Since his return to civilization, Mike has done little more than rest. He's had several movie offers, including one to play Batman in a feature film since Adam West wasn't available. That's not a bad trade, a loin cloth for a bat cape.



Mike Henry takes a "shower bath" between scenes while on location in Brazil.

AMERICAN INTERNATIONAL PRESENTS
THE
SY WEINTRAUB PRODUCTION

CAST

Tarzan ..... MIKE HENRY
Sophia ..... NANCY KOVACK
Vivaro ..... DAVID OPATASHU
Ramel ..... MANUEL PADILLA, JR.
Mr. Train ..... DON MEGOWAN
Perez ..... ENRIQUE LUCERO
Talmadge ..... EDWARDO NORIEGA
Voss ..... JOHN KELLY
Manca ..... FRANCISCO RIQUERIO
Ruiz ..... FRANK BRANDSTETTER
Ramale ..... CARLOS RIVAS
Rodrigues ..... JORGE BEIRUTE
Antonio ..... OSWALD OLVERA

CREDITS

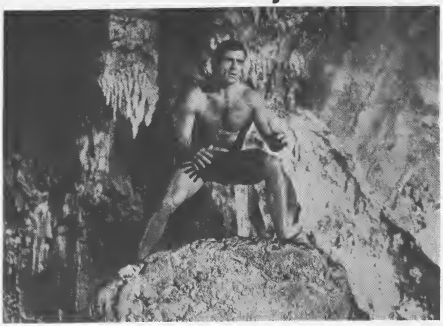
Produced by ..... SY WEINTRAUB
Directed by ..... ROBERT DAY
Associate Producer ..... STEVE SHAGAN
Screenplay by ..... CLAIR HUFFAKER
Based on the Characters
created by ..... EDGAR RICE BURROUGHS
Director of Photography ..... IRVING LIPPMAN
Music Composed and Conducted by ..... VAN ALEXANDER
Film Editor ..... FRANK P. KELLER, A.C.E.
Production Manager ..... SAM MANNERS
Art Director ..... JOSE RODRIGUEZ GRANADA
..... NICKY BLAIR
Assistant Directors ..... MAX STEIN
..... MARIO CISNEROS
Camera Operator ..... JOSE LEON SANCHEZ
Unit Manager ..... ANTONIO GUAJARDO
Continuity ..... JACK GANNON
Assistant Cameramen ..... EMILIO CAIORI
Property Master ..... RAUL SERRANO
Production Assistant ..... MANUEL VASCONCELOS
Hairdresser ..... EVELINA CASAS
Wardrobe Master ..... ALFONSO RUBIO
Make-Up ..... ROMAN JUAREZ
..... ELVIRA OROPEZA
Sound Effects ..... NELSON-CORSO
Sound by ..... PRODUCERS SOUND SERVICE, INC.
Animals by ..... SAFARI RENTALS
..... STEWARD RAFILL, JR.
Main Title Design ..... PHILL NORMAN / CINEFX
Special Effects ..... IRA ANDERSON and
..... IRA ANDERSON, JR.
Assistant to the Producer ..... MARGARET JENNINGS

in Panavision® and Eastman Color

An American International Release
Running Time 100 Minutes

American International® PICTURES

"Tarzan and the Valley of Gold"



We see a peaceful ranchero set in the jungle clearing. A scholarly old patriarch RUIZ, is on the veranda with his pet chimp, Dinky. There is a small boy RAMEL with him. A short distance away, we see several animals in cages, including a lion and a jaguar, which are being fed by the ranch hands. This scene of serenity is suddenly a smoking hell as machine guns and grenades open up. RUIZ falls under the hail of lead. The attacking marauders then set the ranch afire as the little boy RAMEL is dragged off into the jungle night.

The scene shifts to a beautiful luxury liner at anchor in sparkling blue water; then suddenly from the deck of the liner a helicopter lifts up. We see the copter then landing near a luxurious hotel. All this action is seen through the eyes of the binoculars held by the international criminal VINARO. TARZAN alights from the copter and immediately transfers to a jeep which heads for an inland air-field. VINARO turns to his monstrous bodyguard, MR. TRAIN: "Tell them he is here, we know he will be on the 8:50 plane for the capitol." MR. TRAIN departs with the message. VINARO smiles at his girl friend, the voluptuous blonde SOPHIA RENAULT, who is swimming in his private pool high up in the hotel. She returns his look fearfully.

We see a huge jet taxi up at the International Capitol Airport, where TARZAN is greeted by a uniformed chauffeur and whisked through customs to an open convertible. The chauffeur drives him through the beautiful tree lined streets and approaches the great Plaza de Toros, the most famous bull ring in all the world. It is mid-day in the middle of the week, the stands are deserted and the tunnels are dark. TARZAN looks inquiringly at the driver who says: "We are to meet someone here. I was told to bring you to this place." As the car goes down the tunnel and out into the dazzling sun of the bull ring, the chauffeur whips out a pistol, but TARZAN has caught the glint of the gun and deflects the weapon and kills the driver with an expert Judo chop. TARZAN gets out of the car just as a shot rings out and the bullet sprays dirt inches from where he stands. In an unusual sequence, TARZAN outwits the hidden sniper and destroys him with a 35 foot high soda pop bottle. TARZAN then drives himself out of the arena and to the stately home of PROFESSOR TALMADGE, where he has a meeting with the Professor and Chief of Police JUAREZ, and is told that he has been chosen to find the boy RAMEL, who they believe is one of the last survivors of the lost civilization from a city thought to be made of gold. They further say that it is vital that TARZAN reach the city before VINARO, the murderous international criminal who makes a specialty of blowing people up with bizarre gadgets.

TARZAN is then taken to the remnants of the RUIZ ranch, where he selects a full grown lion, jaquar and a chimp to accompany him on his trek into the jungle in his search for the boy RAMEL. Next we see the enemy camp which is in a jungle clearing and consists of fully trained troops, tanks, a helicopter and every modern electronic device. VINARO is telling TRAIN that the boy has escaped and probably joined TARZAN, but they will follow their trail through the secret caves to the lost city. Meanwhile, TARZAN has changed from his civilian clothes to his jungle loin cloth and with the aid of Dinky, the chimp, who was friendly to the boy, has in fact found RAMEL and along with the animals is well ahead of VINARO and TRAIN. As they reach the outer edge of the jungle, they freeze in their tracks as they see a beautiful girl with a strange amulet around her neck. She cannot or will not move. TARZAN approaches her. It is the voluptuous SOPHIA. She has displeased VINARO and he has strung an explosive laden amulet around her neck and left her trussed to a tree and to the whims of the jungle. Ordering RAMEL and the animals to take cover, TARZAN manages with great care and great strength to snap the gold chain and in one motion throws the amulet off and throws himself and SOPHIA to the ground. The earth itself shakes as the amulet explodes. The rescued girl joins TARZAN, RAMEL and the animals on the remainder of the trek. As they reach the great caves leading to the lost city, TARZAN sends RAMEL, SOPHIA and the animals ahead and sets a trap for the oncoming VINARO. TARZAN succeeds in killing off many of VINARO'S men, but he cannot stop the thrust of the tanks.

We next see the emergence into the lost city where thousands of natives have been living the same cultural civilization for 5000 years, amidst the splendor and fantastic archeological pyramids built by their ancestors. The city is governed by an elderly Chief, MANCO. The entire population swarms around SOPHIA, RAMEL, TARZAN and his animals as they come into the main plaza. TARZAN warns MANCO of the approaching menace of VINARO and urges him to take preparation to meet force with force. The Chief replies that they have lived without violence for 5000 years and will not resort to it at this time, and that if all VINARO wants is gold then they will give him their gold. TARZAN tells the Chief that it is not only the gold that VINARO wants, his lust for blood will be vented upon the entire population. MANCO replies that there is no man that cannot be reasoned with and that TARZAN'S way is the way of ultimate destruction. He then takes TARZAN into the great pyramid and shows him what MANCO describes as "their real treasure." This consists of an incredible assortment of ancient weaponry of every description. "You see," says MANCO, "we have kept the symbols of man's

cruelty over the years to remind us of our own need to keep our peaceful ways." MANCO turns, a lever is pressed and TARZAN is imprisioned within the confines of the old weapons room. As MANCO locks in TARZAN, he says: "I apologize for doing this to you, but I cannot t a k e a chance with your life and the lives of my people, or even the life of VINARO."

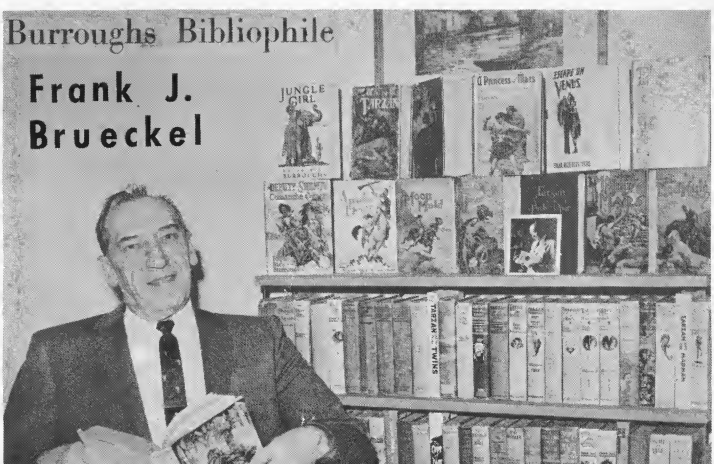
Meanwhile, tanks burst through the city gates and into the main square, hurling thousands of villagers before them. VINARO sits atop the lead tank. As MANCO comes out of the pyramid and walks up to the front of the tank, VINARO demands that a mound of gold be placed in the plaza by morning or everyone dies. The old man complies with this wish, and all night the gold is transferred from an inner chamber room to the plaza. TARZAN, during the excitement, has managed to find a way out of the treasure room and carefully watches the scene from a secluded vantage point.

As the sun comes up in the plaza the following morning, it bounces in all its brillance off a huge amount gold and golden objects. VINARO strides up to the gold and screams at M A N CO that it is not enough, that he is holding out and he will be killed on the spot if the treasure of the lost city is not immediately brought forward. The aged Chief then replies, "Alright, I will show you the true treasure of Tucumai." With MANCO leading, VINARO follows, almost crazed by the prospects of some additional elaborate treasure. MANCO leads VINARO into an inner chamber that has some gold objects in it, but except for these and some gold dust the room is empty. VINARO screams, "Where is it? Where is the gold?" Whereupon, MANCO throws a lever which simultaneously brings the walls together locking VINARO in and releases a huge flow of gold dust which begins to rain down from the ceiling. "There is your gold," says MANCO. VINARO is literally bathing in the downpour of gold, not realizing that it is s l o w l y blocking his last exit from the room. The golden shower spills higher and higher until VINARO, finally realizing he is drowning in the gold, is ultimately trapped and suffocated.

In the plaza, TARZAN overcomes one tank crew and fires with deadly accuracy upon the remaining vehicle, blowing it up and killing the crew with the exception of MR. TRAIN. In a fierce man-to-man strggle TARZAN breaks the neck of the monster. At this moment MANCO emerges from the main temple. As TARZAN and the Chief meet one another the old man says, "In the end even I resorted to violence; but perhaps from this we have both learned something, that sometimes one cannot help but stand up against violence in order to preserve one's way of life." TARZAN leaves a peaceful civilization that is perhaps wiser to the ways of the outside world, as he and SOPHIA depart from the Valley of Gold toward the great caves and modern civilization.

Burroughs Bibliophile

Frank J. Brueckel



If a hoary family legend is to be credited, I made my appearance on this planet on Christmas Eve, 1910, as a panther screamed outside the rough wooden door of the crude log cabin on the bank of the Mississippi -- wup! I guess I'm a little mixed up. My personal recollections of the event are not entirely trustworthy, I must confess, but I know that in one respect I bore a striking similarity to John Carter -- I was stark naked at the time of my advent on Earth.

It was in the fall of 1918 that I became acquainted with Tarzan of the Apes, as portrayed by Elmo Lincoln in a motion picture of that title. Until then, "Africa" had been only a word that I sometimes heard mentioned, but now it suddenly became a very real and exciting place to me -- a land of wild animals and wild men and wild forests replete with thrilling fun and adventure. I wanted to go there right away, and tried to point out to the rest of the Brueckel horde -- my parents and two sisters -- the manifold advantages of life in the jungle. Strangely, my magnificent proposals met with a curious lack of enthusiasm on the part of the others.

In time, the press of such mundane matters as attending public school forced my adventurous ambitions into the background and sometimes even into oblivion, but every now and then the vision of Tarzan scampering through the treetops in pursuit of lions or cannibals would surge again into my memory. Eventually I learned from someone that there existed a book which set forth in complete detail the true facts in the life of this remarkable man Tarzan, and from time to time I brought this to the attention of the household. Then one glorious afternoon in the summer of 1921, when we were living on a farm in southern Pennsylvania, my father returned from a business trip to Philadelphia with a present for me -- an A. L. Burt reprint of Edgar Rice Burroughs's TARZAN OF THE APES. Perhaps no more precious gift ever came into my possession. Like the boy in the story, I read until the fading daylight made the "little bugs" blur and run together before my eyes.

A quarter mile from the house I had my own private half-acre jungle with long wild grape vines hanging down from the trees, and a huge forest monarch with stout branches starting near the ground and a little hollow in the trunk some twenty feet up. Here, in emulation of my hero, I cached such items as a pad of paper and a pencil with which to print notes proclaiming "THIS IS THE HOUSE OF TARZAN," a ten-foot piece of washline (I had failed miserably in the attempt to weave a rope of long grasses), an imitation ivory letter opener which served as the hunting knife of my long-dead sire, string for bows, and various other odds and ends. Among my Tarzan souvenirs I also collected an assortment of bruises, cuts, skinned palms, and wrenched knees. It was a matter of some regret to me that I did not acquire a great scar across my forehead from temple to eyebrow, to flame red when I got angry.

The following Christmas was one of the most memor-

able of my youthful life, for under the festive tree that morning I found, not one, but four new Tarzan books: THE RETURN OF TARZAN, THE BEASTS OF TARZAN, THE SON OF TARZAN, and TARZAN AND THE JEWELS OF OPAR. Thereafter I added about one Tarzan book per year to my library.

My introduction to the Mars series came when I was living in Milwaukee, in 1925. First I borrowed the books from the public library, but by 1927 I decided to begin purchasing these titles also, and indeed to acquire a complete set of ERB's books. But I cannot call myself a Burroughs collector, for with very few exceptions I have but one hardbound copy of each of his major works, plus the Ace and Ballantine paperbacks and a few magazines. While I envy people like Vern Coriell, Stan Vinson, Darrell Richardson, and Henry Heins, who seem to have a sample of just about everything containing the name Edgar Rice Burroughs, I get a sinking feeling when I think of the time, money, and effort it would take now to acquire such a museum of Burroughsiana.

From late 1927 until I received the President's greetings in early '41 a sporadic correspondence occurred between Burroughs and me; I'd write him a letter telling him what was wrong with his latest book and how much I enjoyed it, and he would write back promptly and courteously, thanking me for my comments and interest. During the late '20's I wrote some atrocious "science fiction" myself, a little of which slipped into print. Right after publishing my first opus Hugo Gernsback was forced to relinquish the editorship of Amazing Stories.

I finally got to Africa in 1942 -- one day in Durban, Natal, and (after some four months in Palestine during which I spent several hours in archaeological verification of biblical history) half a year near Tripoli on the Mediterranean. Then to Italy for two years. During this time I got completely out of touch with the writings of ERB, though I remember seeing a photo of him in Stars and Stripes with the caption stating that he was a war correspondent in the Pacific.

Upon returning to civilian status after the war, I conned my way into college and in the fullness of time was paroled from UCLA with a Bachelor's in mathematics. Spent another year at a teachers' college getting a General Secondary credential, but never put it to use. After a couple of jobs in other fields I wound up as an astronomical research assistant, fooling around with what is known in the trade as "the cosmological problem." (This concerns the questions of how big the universe is; whether it is really expanding, and if so, why; whether the expansion will continue indefinitely or ultimately stop and reverse itself; how long ago the expansion began; how stars and galaxies are formed, the course of their subsequent evolution, and what finally becomes of them. The work consists of a lot of measuring, calculating, and head-shaking -- in that order -- and my guess is that a few hundred years from now astronomers will still be gnawing on the same bone.)

As already remarked, I got out of touch with Burroughs during the war and the five extremely busy years that followed. I didn't know of his long illness, so it was quite a shock to me to hear the radio announcement of his death in March of 1950. How I regretted then that I had never gone up to Tarzana to meet him! Often had I thought of doing so, but I had always procrastinated, feeling that such a visit might be merely an imposition on a very busy man's time. In the past couple of years I have, however, had the pleasure of several most enjoyable meetings with Hulbert Burroughs at Tarzana, and find him to be a man very much like I imagine his father to have been: friendly, modest, interested in people, with a love of nature and an avid interest in the challenges and mysteries which the universe constantly presents to us.

Edgar Rice Burroughs fired my interest in science and in the tantalizing riddles that lie at the borderline of every field of knowledge. When I read about Opar in THE RETURN OF TARZAN, it wakened within me a deep, groping wonder about the unrecorded story of mankind in the misty past. Another glimpse into an even remoter era was given me when I encountered the Pal-ul-donian gryf in TARZAN THE TERRIBLE. The Mars stories led me to see the stars and planets as more than mere pinpoints of light in the night sky. I began to search for more information on these and other matters to which Burroughs had directed my attention, and thus was led into the field of general science fiction and into serious, factual books on history and science.

To me the appeal of ERB's colorful stories resides not only in their ability to provide temporary escape from the stresses and monotonies of everyday existence, or their assuaging of a subconscious nostalgia for the untroubled childhood when I first encountered them. There is also something deeper. It lies in the strong and optimistic philosophy which runs between the lines of the stories, which asserts that however great the evils that may threaten the higher ideals that Man has slowly evolved in the course of his history, yet finally these ideals will emerge triumphant.

Edgar Rice Burroughs wrote to entertain. This was his sole conscious purpose, and few other writers succeeded in entertaining so many people over so many years in so many different parts of the world. But he did more than entertain, for in his splendid heroes and heroines he presented ideals to fire the aspirations of every reader, and in the thrilling worlds of his imagination he planted the seeds of wonder and appreciation of the fascinating universe in which we live.

EDGAR RICE BURROUGHS, INC.
TARZANA, CALIFORNIA
TELEPHONE RESEDA 222

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NORTH LOS ANGELES, CALIFORNIA
CABLE: BURROUGHS,
NORTH LOS ANGELES, CALIFORNIA
EXPRESS:
NORTH LOS ANGELES, CALIFORNIA

March 3, 1932

br

Mr. Lester Anderson,
271 Peralta Street,
Hayward, California.

My dear Mr. Anderson:

I have to thank you for your letter of February 27 and the suggestions it contained. I have long thought of writing a story of Atlantis, but editors have discouraged me inasmuch as they consider the theme rather threadbare. Perhaps, however, I shall do an Atlantis story some day.

THE EFFICIENCY EXPERT is a magazine story I wrote a number of years ago. As it is too short for full length novel, it has never appeared in book form.

THE TARZAN TWINS is published by P. F. Volland Company, Joliet, Illinois. It is the only juvenile story that I have written, and I imagine it may be difficult to obtain it except through the publishers.

I have written quite a number of stories that have appeared in magazine form that have not as yet been published in book form. Several of these are, like THE EFFICIENCY EXPERT, too short to make a complete novel, and others have been held back to give preference to stories for which we know there is a demand.

Again thanking you for your letter, I am

Very sincerely yours,

Edgar Rice Burroughs

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NORTH LOS ANGELES, CALIFORNIA

September 23, 1932 br

PLEASE ADDRESS BUSINESS COMMUNICATIONS TO THE COMPANY

Mr. Lester Anderson,
271 Peralta Street,
Hayward, California.

My dear Mr. Anderson:

Many thanks for your suggestion that I read Man's Own Show: Civilization. I shall order a copy at once.

Am glad that you like my nephew's illustrations and that you are pleased with my daughter's work over the radio.

Thanking you for your letter and with best wishes, I am

Very sincerely yours,

Edgar Rice Burroughs

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October 14, 1933 br

PLEASE ADDRESS BUSINESS COMMUNICATIONS TO THE COMPANY

Mr. Lester Anderson,
271 Peralta Street,
Hayward, California.

My dear Mr. Anderson:

I was much interested in your letter of October 11. You may rest assured that I do not want to get Tarzan into politics. If you will analize the story to which you take exception, you will discover that my star villain is not a good Red, but an ambitious criminal whose purpose is to use the backing of the USSR to achieve his own selfish ends.

You will also appreciate that I must have a villain, and inasmuch as the Soviet Government does not protect my rights in Russia and permits the pirating of my books without royalty payment to me, I might as well hop onto Russia as anyone else because the sale of my books in that country brings me no income.

Some day I hope to publish many of my earlier stories in book form, but just now the plan does not work in with our present method of publishing two novels a year.

Again thanking you for your letter and with best wishes, I am

Very sincerely yours,

Edgar Rice Burroughs

JUNE 17, 1932

Tarzan Sees Modern Warfare In News New Comic Strip

The new Tarzan picture-story, "Tarzan the Untamed," which begins Monday in The News, is the first Edgar Rice Burroughs story of the ape-man hero to deal with modern warfare.

It is an imaginary war this time between a Russian expeditionary force dispatched to British East Africa and the British army stationed there.

The previous Tarzan picture-stories have been taken direct from Mr. Burrough's books. "Tarzan the Untamed" has been rewritten and packed with new episodes and new thrills.

Tarzan, returning from the jungle to his vast estate, finds the buildings of his farm in ruins, his brave Waziri killed and in his wife's room there is a charred body identified as Lady Jane by the rings she wears. Thus Tarzan learns that war has come to Africa.

The ape-man's wild, primitive blood-lust is aroused as he vows vengeance. In blind fury he goes forth to find the perpetrators of the crime. So he becomes embroiled in action.

"Tarzan the Untamed" is one of the most sensationally absorbing narratives in the whole Tarzan saga. In it, Edgar Rice Burroughs, who was born and trained in the American army and who served in the American army, gives free expression to the romance of the martial spirit.

That Burroughs is not today an army officer instead of the most widely read writer living is due to mathematics. His father was a regular army cavalry officer and as a boy Edgar Rice Burrough grew up intending to follow in his father's footsteps. He had the army in his blood and he had also infrained in him from childhood exciting stories of his father's adventures in the Civil War and as an Indian fighter.

Preparatory to entering West Point, Edgar Rice Burroughs studied at Culver Military Academy, where a good part of the training consists in cavalry drill. But when the time came for West Point, the future officer was stopped by the mathematics examination. Failing to qualify as a student officer, he enlisted as a private in the regular army cavalry and he served his hitch primarily in Arizona.

When he wrote "Tarzan the Untamed" as a book, he built the story around the campaigns of the German and British armies in Africa. But now he has completely revised the story so that when it appears in a picture-story it will be virtually a new tale.

Instead of the German army, an imaginary Red Army swings into action, and there is a new and fascinating heroine in the beautiful English girl who grew up to become a Russian spy.

Tarzan in Modern Warfare!

The ape-man hero of the African jungles . . . fighting ever alone with knife and spear and bow and arrows as his only weapons . . . now swings into action in a terrain swept by machine gun bullets and heavy shells.

An imaginary Red army, sweeping the world into new conflict, has dispatched a force to British East Africa. . . . There Tarzan, remote from affairs of men, finds himself swept into fighting fury as his home is ravaged, his brave Waziri spearmen killed. . . .

Follow these new adventures daily in

TARZAN
The Untamed

By
Edgar Rice Burroughs
Today on Page 17

The above clippings and the three letters from Edgar Rice Burroughs are from the collection of Lester Anderson. The letter dated October 14, 1933 refers to the "revised" story strip of TARZAN THE UNTAMED as well as the book. TARZAN THE INVINCIBLE. Les informs us: "Re the letter of September 23, this is the volume by the anthropologist George A. Dorsey, WHY WE BEHAVE LIKE HUMAN BEINGS, etc. This is still available as THE STORY OF CIVILIZATION. It would be interesting to know if ERB followed this one through."

This is the second of a series of letters from ERB to Burroughs Bibliophiles which will be reproduced in future issues of the BB. If you have such letters that you would like to share in this manner you are invited to send them to the editor. Please be sure to send them by first class or insured mail. They will be returned promptly.

IN MEMORIUM: LORD GREYSTOKE

Majestic Africa,
The Dark Continent,
Is no more.

Mighty forests tremble,
Retreating
Before the shining blade of Progress.
Houses sprout
Where once the King of Beasts had lair.
The jungle
Has been conquered by the plow.

Gone are the steaming tropical forests.
Gone are the endless grassy plains.
Gone are the arid, barren deserts.
The towering mountains alone remain.

Gone forever
Is the wild, savage land
That Greystoke ruled,
And loved.

Gone are the foes:
The howl of the Hyena is hushed.
Nevermore shall the Leopard haunt the treetops,
Nor shall the black-maned Lion
Stalk the antelope
Slay the zebra.

Likewise gone are friends:
There shall be no quiet hours
Astride Tantor's broad back,
Wandering slowly down some verdant path,
At peace with all.
The mangani
The Waziri
All are gone.

Even little N'Kima
Tiny companion
Is lost to you.

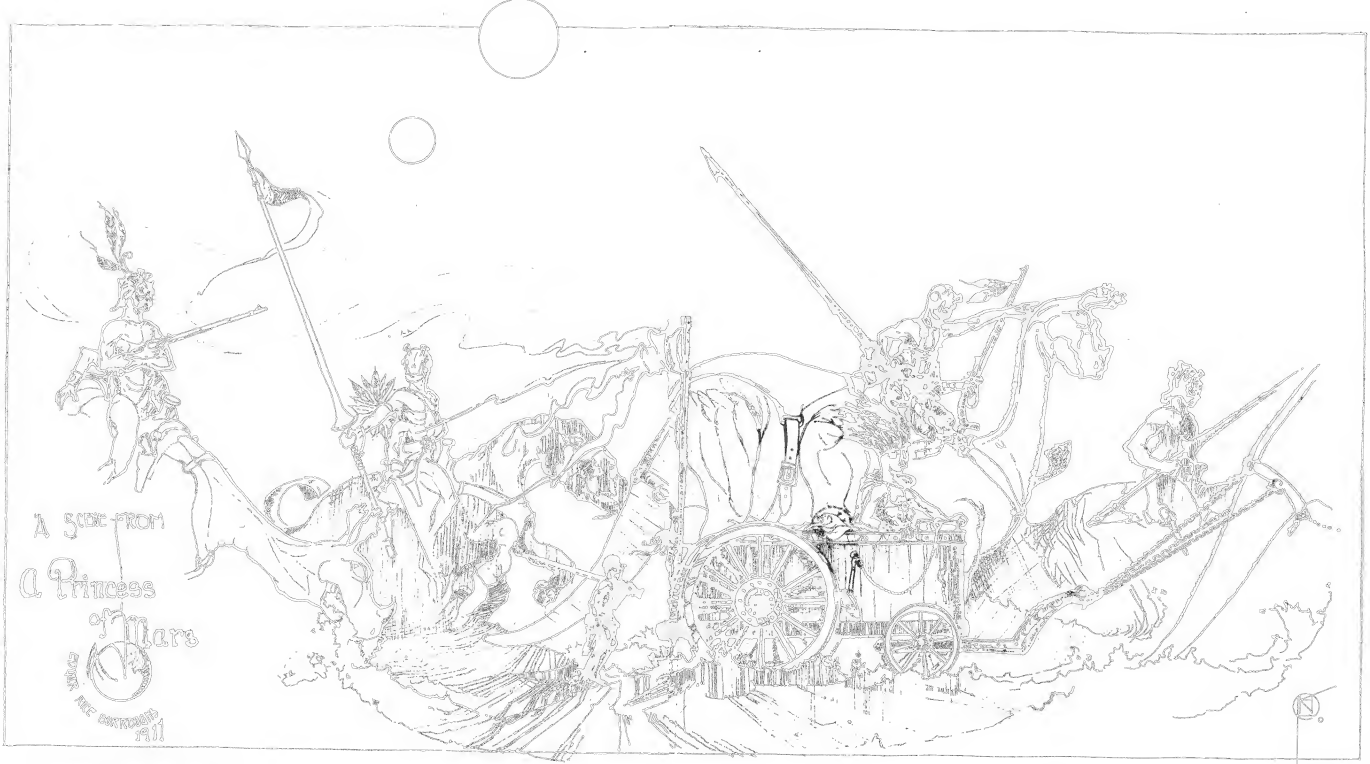
Alas! Lord Greystoke
Long unconquered,
Have you met your match
In civilized society?

Will you be content
In jungles of
Asphalt and concrete?
Will you accept
The skyscraper
The automobile
When forests of dark green
And grassy veldts
Are but fading memories?

Will e'er Usha the Wind
Carry the scent of game
To your quivering nostrils,
Thrilling you
With visions of
The chase and kill?
Acute are your senses
Stifled now
By acrid city smog.

In the past
Your eyes beheld
A secret inner world,
Virgin lands
Where men and beasts
Contend for survival
In bloody contests
Fought with strength
And sometimes won
By cunning.

Mankind
Has yet to ravage
This unspoiled land
At the earth's core.
Mammoth and mastodon
Inhabit uncharted plains,
Sabre-tooth tigers
Stalk the shaggy Bos,
Giant reptiles
Fill the sky and seas
With terrible cries.
Dinosaurs reign supreme
And man
Is but a minuscule intruder
Beneath the eternal sun.



Having seen the world without
Grow tame,
Polluted and corrupted
By the hand of man;
While the world within
Remains so fierce,
Alive and fresh;
Could you remain
In the one abhorred,
While beneath your feet
A younger land lay
Taunting you
Waiting to test you
Your courage and strength?

Bid your last farewell,
Lord Greystoke,
And be gone.

Tarzan of the Apes
Invincible Lord of the Jungle
Return now to Pellucidar.

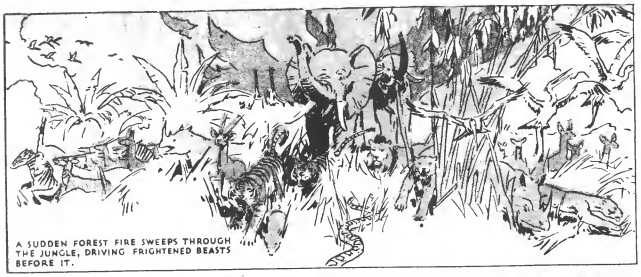
February 19, 1967

James F. Thompson

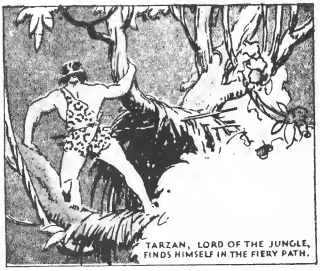
Tarzan

by EDGAR RICE BURROUGHS

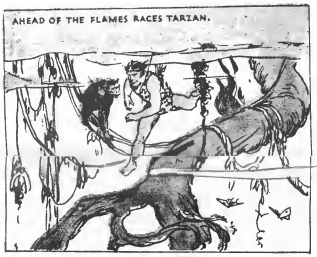
THE DANCE OF VICTORY



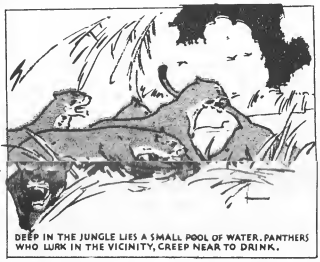
A SUDDEN FOREST FIRE SWEEPS THROUGH THE JUNGLE, DRIVING FRIGHTENED BEASTS BEFORE IT.



TARZAN, LORD OF THE JUNGLE, FINDS HIMSELF IN THE FIERY PATH.



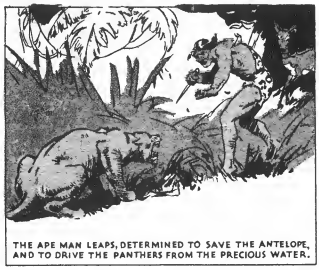
AHEAD OF THE FLAMES RACES TARZAN.



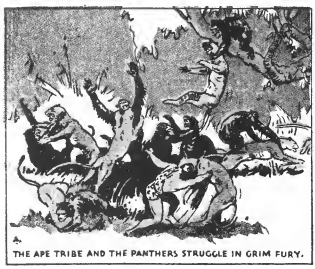
DEEP IN THE JUNGLE LIES A SMALL POOL OF WATER. PANTHERS WHO LURK IN THE VICINITY, CREEP NEAR TO DRINK.

A LONE ANTELOPE, THIRSTY AFTER ITS LONG RUN FROM THE JUNGLE FIRE, APPROACHES THE WATER POOL. A PANTHER LIFTS ITS HEAD AND SNARLS, AND . . . .

TARZAN SEES THE DEFENSELESS ANTELOPE AND THE PANTHERS AT THE WATER POOL.



THE APE MAN LEAPS, DETERMINED TO SAVE THE ANTELOPE, AND TO DRIVE THE PANTHERS FROM THE PRECIOUS WATER.



THE APE TRIBE AND THE PANTHERS STRUGGLE IN GRIM FURY.

LED BY TARZAN, THE APE HORDE WINS THE WATER POOL.

THE VICTORY INSPIRES THE APE MAN. AGAIN HE IS THE LEADER OF A VICTORIOUS APE HORDE. REFRESHED BY THE WATER, HE LEADS THE APES IN A WILD DANCE OF VICTORY.

NEXT — ABOARD A SLAVE SHIP

RANDOM BURROUGHING

by Allan Howard

Among favorite indoor games there is one, of which it might be said, that any number can play. It might be called "Where Did Edgar Rice Burroughs Get His Ideas?"

Included among the star players can be numbered Richard Lupoff, Fritz Leiber, and L. Sprague de Camp. Each of these gentlemen has built impressive cases tracing ERB's literary well-springs to such diverse sources as Theosophy, Kipling, John Cleve Symmes and Edwin Arnold. Usually Burroughs himself was rather coy on the subject, so there remains, when all is said and done, a singular lack of positive proof that these were indeed the sources of ERB's inspiration.

Although I too would like to be considered an expert I have not joined in this game because Howard only likes to bet on "sure things" However, the recent publication of the fanzine, HEROES ILLUSTRATED #2 gives me a unparalleled opportunity to be a literary detective.

HEROES ILLUSTRATED #2 is edited and published by Dick Pryor, 8 Marquard Road, Carmel Valley, Calif., and features an article by Harry E. Habblitz on Burne Hogarth, the popular illustrator of the Tarzan Sunday strips in the '30's and '40's. In addition, as an example of Hogarth's work, there is a fifteen page reprint of the 1949 Sunday sequence of "Tarzan and the 'Ononoes'". This story concerns the ape-man's adventures among a lost race of beings, whose physical appearance consists of a large head and a pair of arms. I don't know where Burroughs got his ideas, but I do know where Hogarth got the idea for "Tarzan and the 'Ononoes'".

The type of novel that has come to be known as "lost race" may roughly be said to have flourished during the four decades that bracketed the last turn of the century. Scores of them were published, including among them "The Fallen Race" by Austyn Granville, illustrated by Edward Mason. (F. T. Neely, New York & Chicago, 1892)

It was in the year 1874 that the ill-fated Frisbee expedition marched off into the then unexplored interior of Australia. Within four months of leaving Melbourne this gallant band of twenty picked men had succumbed to the hardships of the desert. Two weeks later, the sole survivor, Dr. Paul Gifford and his companion, the chance-met aborigine, Jacky-Jacky came upon the vast inland lake they learned to call Anono. Not long afterward, upon returning to their camp-fire they were astounded to discover three strange beings warming themselves and conversing in an aboriginal dialect.

They are described as "...perfectly round, about four feet in height, covered with fur and looking like an exagerated hedgehog. They had small oblong and very human eyes, placed about eight inches above the center of the body, and short ears. Their arms were short, ending in diminutive, fur covered paws. They progressed by rolling swiftly on their sides and in great bounds through the air."

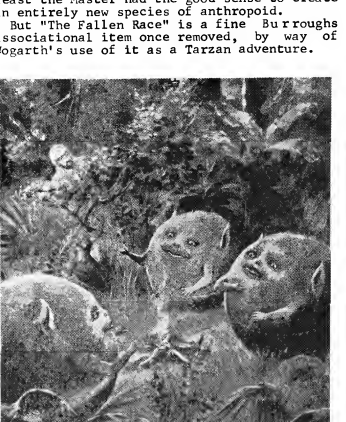
Jacky-Jacky suspects that these strange creatures are the descendants of the fabled Fallen Race. Many ages ago a certain tribe had wandered into the interior to a region overrun with a particularly large and intelligent species of kangaroo. Defeated in battle, the remnants of the aborigines were assimilated into the kangaroo race. These spherical people were the result of that strange union.

Taken prisoner, the two travelers are brought to the city of Anono located on an island in the lake. There, in the classic "lost race" tradition, they find the Anonos are ruled by a White Queen. Known as Azuela, as a child the queen was found by the Anonos in the desert after her pioneer parents had perished.

Gifford casts his lot with Azuela and the Fallen Race, and after handling war, intrigue and rebellion eventually rules with her as King. Jacky-Jacky is his strong right arm throughout. Along the way Gifford introduces the multitudinous benefits of civilization to the Anonos, including iron, printing, sailing ships, dynamite, and Christianity. The Anonos become a civilized power in their part of Australia and eventually contact is made with the outside world.

Beyond certain basic elements common to most Lost Race stories, Hogarth's version owes nothing but the idea of the Ononoes to the book. Despite the enthusiastic testimonial of Granville's contemporary, author Opie Read, in his Introduction, "The Fallen Race" makes dreadfully dull reading. It is of interest only as curiousa of an earlier and more credulous day. Granville's ludicrous idea that humans and kangaroos are cross-fertile goes beyond even Burroughs and his Mangani. At least the Master had the good sense to create an entirely new species of anthropoid.

But "The Fallen Race" is a fine Burroughs associational item once removed, by way of Hogarth's use of it as a Tarzan adventure.



THE DOCTOR'S DISCOVERY.

Tarzan

by Edgar Rice Burroughs

A STUDY OF THE OMOS PLANETARY SYSTEM BY FRANK J. BRUECKEL

For BEYOND THE FARTHEST STAR and TANGOR RETURNS, Edgar Rice Burroughs created an unusual and interesting planetary system to serve as the general locale of these stories. It is sad that time and health did not permit him to complete even the first full-length volume of what could have become one of his most fascinating series.

The two novelettes he left us are placed on "Poloda", an earthlike planet which is not a member of our own solar system, but instead circles about a small star called "Omos" by the planet's human inhabitants. Nor is Omos a relatively near neighbor of our Sun in the stellar universe. We are told in STAR, p. 24,* that Poloda -- or more properly Omos, the star of which Poloda is an attendant planet -- is situated some 230,000 light-years beyond "Canapa", a globular star-cluster known to our own astronomers as NGC 7006.** It is further stated that Canapa is 220,000 light years from our own solar system; in other words this cluster is about midway between our Sun and Omos, so Poloda is around 450,000 light years from the Earth. On page 41 of STAR we learn that the figure 450,000 refers to earthly light years; for naturally, as different planets usually have different lengths of "year", the light-year as a unit of distance is meaningless unless it is understood what planet's "year" is involved in the definition. An earthly light-year -- the distance light covers in one of our years at a speed of 186,000 miles per second -- is about 5.88×10^{12} miles; i. e., nearly six trillion miles in American parlance, or six billion in European where a "billion" means a million millions. Thus the Omos system is about 2.65 million million million miles from our own. This is over 100,000 times the distance to our nearest stellar neighbor, the triple star Alpha Centauri (of which Proxima Centauri is the smallest and nearest component), and some 700 million times as far as our remotest known planet, Pluto.

As we all know, our Sun is one of about 200,000,000,000 stars grouped in a vast, slowly revolving, lens-shaped structure called the Milky Way, or "The" Galaxy, which itself is one of an estimated 100,000,000,000 more or less similar systems scattered throughout the universe.

The center of our galaxy lies in the direction of the constellation Sagittarius, a few degrees from the point reached by the Sun at the Winter Solstice on December 21 or 22. It is a region of tremendous, dense star-clouds, veiled by even more enormous clouds of gas and dust which in some places are so thick as to completely hide the millions of stars behind them. The distance of our solar system from the Galactic Center is judged to be approximately 30,000 light years, but there is some uncertainty because the intervening dust-clouds render very difficult the measurement of certain quantities necessary for establishing the distance.

The globular cluster NGC 7006 is situated in the constellation Delphinus, about 50° eastward and 15° northward of the Galactic Center. Its currently accepted distance from us is around 135,000 light years -- somewhat over half the figure given in STAR; but Burroughs probably cited the estimate made by Shapley over forty years ago, when astronomers did not make full allowance for the obscuring effect of the gas- and -dust clouds around the Galactic Center. These thick veils of interstellar haze make everything beyond them seem dimmer and redder, hence more distant, than is actually the case. As our galaxy has a radius of about 45,000 light years, its further edge is some 75,000 light years from us; therefore NGC 7006 is roughly 60,000 light years beyond the rim of the Galaxy on the other side of the Center. It is, in fact, one of the remotest known star-clusters associated with our own galaxy.† (The famous great spiral galaxy in Andromeda has its own swarm of attendant globular star clusters, and the same is probably true of most other galaxies.)

The majority of the hundred-odd known globular clusters are scattered through an ellipsoidal volume of space around the Galaxy, forming what astronomers call the "halo" of our stellar system. In Fig. 1 I attempt to show, crudely and somewhat inaccurately in two dimensions, the relative positions of our Sun, NGC 7006, and Omos, adopting Burroughs' figure of 230,000 light years between the latter two objects.

Seen from Poloda or any of the other planets of the Omos system, our Galaxy would no doubt present an impressive and somewhat eerie spectacle. Its appearance would be much like that which the great Andromeda galaxy offers to us in a sizeable telescope (Plate 1), because Omos lies about as far out of the plane of the Galaxy as we lie out of the plane of the Andromeda system. But as we are four or five times nearer Omos than M 31 is to us, our Galaxy would look far larger to the Polodan observer, and about as bright as the Milky Way looks to us on Earth. To the unaided eye on Earth, only the central nucleus of M 31 is faintly visible as a fuzzy patch of light near the zenith of northern mid-latitudes at midnight in early fall, but the naked eye on Poloda may well be able to distinguish virtually the whole grand structure of our own Galaxy. Its longest dimension would reach across some 15° of the Polodan night sky -- thirty times the diameter of the full Moon. Since the Omos system is isolated to a degree we can hardly imagine (though there may be a few other lonely lost stars wandering forlornly through the terrifying emptiness of intergalactic space, separated

* Page numbers refer to the Canaveral edition of TALES OF THREE PLANETS, in which the Tangor stories are the first two.

** The designation NGC 7006 means that this is the 7006th object listed in Dreyer's NEW GENERAL CATALOGUE of Star Clusters and Nebulae, published by the Royal Astronomical Society in 1888.

† In the past ten years or so, several even remoter globular star clusters belonging to our galaxy have been found through the 200-inch reflector on Palomar Mountain; but at the time ERB wrote the Tangor stories NGC 7006 was the most distant cluster known. No doubt this is the reason for his choice of title for the first story.

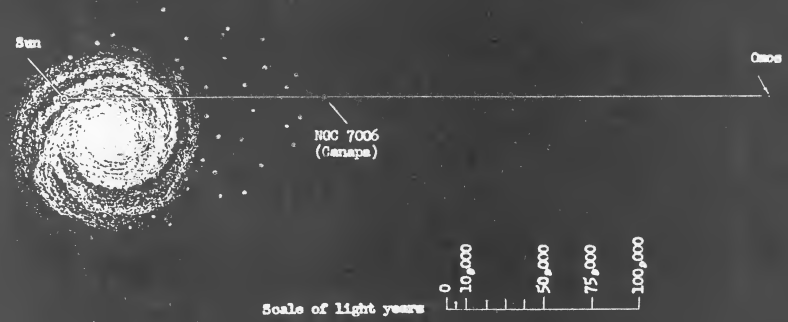

Sun
Omega
NGC 7006
(Canapus)
0
10,000
50,000
75,000
100,000
Scale of light years

Fig. 1

by staggering distances), the Poloda sky at midnight must be an awesome black void, perhaps without a single star to gleam through its looming immensity. At the proper season and latitude, our Galaxy would be the only clearly visible object in the Poloda nocturnal heavens, aside from two or three of the nearer planets and possibly the faint, ill-defined patch of the Andromeda galaxy about 120° away from our own.

There are just two questions about all this which bother me mightily: first, how in hell do the Poloda astronomers know that "Canapa" is called "NGC 7006" by our astronomers? How do they make the identification? And second, how do they know that our solar system -- an undistinguished mote lost in the tremendous star-swarm of the Galaxy -- is (taking ERB's word) 220,000 of our light years beyond Canapa?

2

The Tangor stories represent in several ways a rather sharp break with Burroughs' earlier tales of extraterrestrial adventure. There is no gorgeous princess whom the hero loves and rescues from a succession of desperate situations by magnificent feats of skill, strength, and valor; not until the end of the second story is there a suggestion that the hero may be on the verge of developing a romantic interest in one of the female characters, or she in him. The hero himself, while performing his duties with high courage and creditable ability, displays none of the superhuman prowess of John Carter or David Innes or Carson Napier. He does not leap to eminence as a mighty warrior on Poloda, or win himself an empire and the adulation of a world. He begins his career as a garbage collector, and only slowly climbs to positions of higher responsibility and social prestige. The war between Unis and Kapara in which "Tangor" becomes involved is not one of single, climactic, decisive battles such as we find in the Mars books; it is a dreary, long-drawn agony of inconclusive air-raids, of ever-present fears, of varying degrees of privation and hardship, of generally drab and mirthless existence. In short, it is not a fairy-tale war, but a real war like those our own world has been going through since 1939; specifically, it is our own World War II.

Evidently Burroughs intended the Tangor stories as a commentary on the situation of our world at the time. I suppose they might be called "propaganda," in which ERB sought to contrast the virtues of democracy to the evils of totalitarianism. Throughout the two stories his imagination is kept under close restraint. The only magical element is the method of the hero's transport to Poloda and the relaying of his story to Earth; but this has no bearing on the plot. The hero's adventures on Poloda are quite believable in terms of our own earthly experience. The manners, customs, and institutions of the Polodans, their technology and culture, are very like our own, and the planet itself is remarkably similar to the Earth. In fact, I fancy that Poloda simply represents ERB's conception of what Earth would be if World War II had continued for fifty years or so.

In the Tangor stories, then, Burroughs aimed at realism, striving to eschew extravagant fancy. Yet, probably for a number of reasons, he didn't want to write just another novel about World War II. His forte, after all, was the tale of high adventure in a strange, rather fantastic environment. So for the Tangor stories he invented a unique planetary system centered on a small star he called "Omos", located far outside the limits of our own galaxy.

The system consists of the central star, Omos, and eleven almost identical planets revolving around it in a common circular orbit, along which they are spaced at equal intervals. Poloda is one of these planets. Apparently with the intention of taking his hero to other planets of the system as the series grew, Burroughs imagined a tube of air to extend all around the orbit, revolving with the planets and providing an aerial pathway from world to world. The Omos system is depicted in Fig. 2. As ERB describes it in STAR, p. 63: "Around Omos . . . revolve eleven planets, each approximately the size of the Earth. They are spaced almost exactly equidistant from one another, the path of their orbits being a million miles from the center of the sun, which is much smaller than the sun of our own solar system.

"An atmospheric belt 7200 miles in diameter revolves with the planets in the same orbit, thus connecting the planets by an air lane which offers the suggestion of possible interplanetary travel."

Burroughs was living in Honolulu when he wrote the Tangor stories. Apparently he was about halfway through BEYOND THE FARTHEST STAR when concern for scientific credibility---probably owing to the wish to write a completely plausible tale --- prompted him to seek expert opinion on certain technical points in the stories. Therefore, early in November, 1940, he exchanged a number of letters with Prof. J. S. Donaghho (since deceased) of the Department of Astronomy, University of Hawaii. Through the courtesy of Mr. Hulbert Burroughs, I have been priveleged to examine copies of this correspondence.

In his opening letter under date of Nov. 1, 1940, ERB enclosed a diagram of the Omos system, essentially like Fig. 2, and asked several specific questions: (a) whether the planets could move in a circular orbit, or whether they must of necessity move in ellipses; (b) which of the other planets would be visible at night and by day to an observer on Poloda; (c) assuming Poloda to have oceans comparable to ours, whether the tidal effects of Omos and the other planets would be great enough to preclude sea navigation. (A fourth question seems to me to have no direct reference to the Omos system as depicted in the stories.)

Professor Donaghho's response, dated Nov. 4, 1940, assured Burroughs that the planets could indeed travel along a circular orbit, but would all have to be of exactly the same mass in order to remain equispaced around that common orbit, since a planet's orbital velocity depends to some extent on the planet's mass as well as that of the central sun. (I will return to this point in due course.)

To ERB's second question Prof. Donaghho replied that if planet P rotates on its axis in the direction indicated in Fig. 2, an observer on P would see planet V a little above the setting sun, and W, X, Y, Z each successively higher up, with Z near the zenith. V would set first (soon after sunset), and then W, X, Y, Z in succession, the last shortly before midnight. A little after midnight Q would rise, followed by R, S, T, and U in order, the last just before sunrise. (Planets V through Z would rise in turn during the forenoon, Z just a little before midday; Q would set soon after midday, and planets R, S, T, U in turn during the afternoon.) Donaghho opined that planets Q and Z might be visible in daytime, but probably none of the others with the doubtful exception of R and Y. (I may add that just before sunrise and just after sunset the observer on Poloda would see

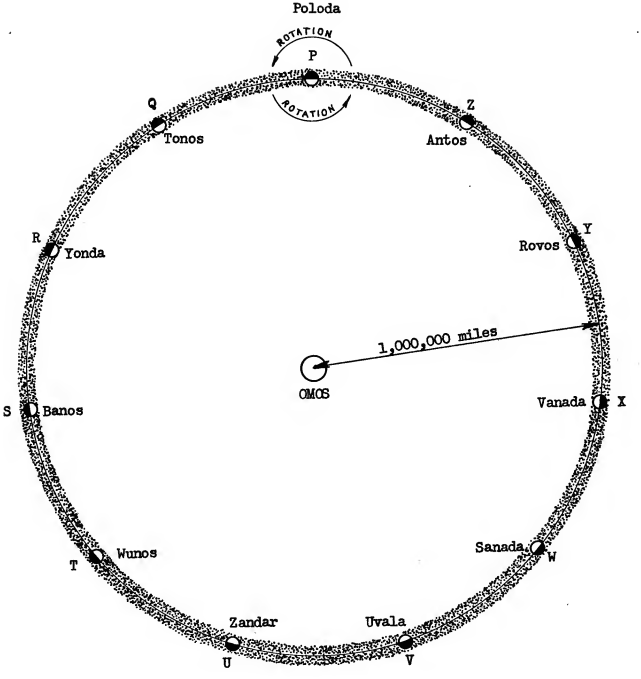

Poloda
ROTATION
P
ROTATION
Q
Tonos
Z
Antos
R
Yonda
Y
Rovos
1,000,000 miles
CMOS
S
Banos
Vanada
X
T
Wunos
Sanada
W
Zandar
Uvala
U
V

Fig. 2

five planets above the sunward horizon; but one of these -- U in the morning, V in the evening -- would be very low in the sky and probably lost in the glow of the atmosphere illuminated by the sun. These two planets, U and V, are only about 5° from Omos to the observer on P. For a short time around midnight none of the other planets of the system would be above the Poloda observer's horizon.*)

In answer to Burroughs' third question, Donaghho pointed out that the tide-producing force of one body on another varies inversely as the cube of the distance separating them. Since Omos is only a million miles from Poloda, or 1/93 of the distance between Earth and our Sun, he computed that Omos's tidal force on Poloda would be 93^3 or over 800,000 times as great as the Sun's tide-raising force on the Earth. Not only would the tides on Poloda preclude ocean travel, he concluded, but very likely they would sweep completely over the planet's continents and thus prevent life from ever developing. Donaghho clearly based this result on the premise that Omos has a mass equal to that of our Sun.

Although ERB had not raised the question, the professor also wrote that the atmospheric ring connecting the planets would not be stable, but would dissipate itself through space, with each planet retaining as much of the atmosphere in its immediate neighborhood as its gravitational power would permit. (In STAR, p. 48, we read that Poloda's atmosphere rises about 100 miles above the planet, being dense enough to permit flying to an altitude of about 15 miles without need of an oxygen mask.) He closed his letter saying it had been fun answering ERB's questions, and offering any further assistance that might be required.

In his next letter, dated Nov. 7, ERB expressed his thanks to the professor for the help rendered. "The total loss of the atmosphere band desolated me," he wrote, "especially inasmuch as I had already used it in the first installment of the story." This suggests that STAR had been completed at the time he received Donaghho's reply. But in this same letter Burroughs vowed to alibi himself out of his allusion to an atmosphere-ring "in the next installment" -- so apparently he had not yet begun on TANGOR RETURNS. Nevertheless, as we know from this story, ERB did not make any serious attempt to retract the air-ring idea; evidently he was too fond of it (and probably felt that he would have a definite need for it later in the series) to relinquish it willingly and completely. We recall that at the close of TANGOR RETURNS, Tangor is on the eve of attempting a flight to the neighboring planet Tonos in a special radio-powered airplane.

Donaghho's remarks about the gigantic tides on Poloda bothered Burroughs, and led him to address another communication to the professor on Nov. 18. In this he pointed out that Omos was supposed to be much smaller than the Sun, and asked if in view of this, the Polodan tides would be as huge as Donaghho had indicated.**

Two days later Donaghho wrote back, admitting that his conclusions concerning tides on Poloda had been based on the assumption that Omos has the same mass as our Sun. He went on:

"If the mean density of your sun were the same as that of our sun, and its diameter about 20% greater than that of the earth, on a planet whose mass was the same as our earth, and at a distance of one million miles, it would raise tides about the same as ours."

A few of my readers may be curious how Prof. Donaghho arrived at his figures. The computations are very simple.

The tide-raising force F which a body of mass M exerts on another body at distance D varies directly as M and inversely as the cube of D. Thus if $M_\odot$ is the mass of our Sun, and $D_\odot$ the distance from Sun to Earth (93,000,000 miles), then the Sun's tidal force $F_\odot$ on the Earth will be

$$F_\odot = \gamma M_\odot / D_\odot^{\,3} ,$$

where γ is a proportionality constant. Similarly, if M is the mass of Omos and D (= 1,000,000 mi.) the distance from Omos to Poloda, then the tidal force of Omos on Poloda is

$$F = \gamma M / D^3 .$$

Hence

$$\frac{F}{F_\odot} = \frac{\gamma M}{D^3} \cdot \frac{D_\odot^{\,3}}{\gamma M_\odot} = \frac{M}{M_\odot} \left(\frac{D_\odot}{D}\right)^3 = \frac{M}{M_\odot} \times 93^3$$

$$= 804{,}000 \times \frac{M}{M_\odot} \text{ , approx.} \qquad (1)$$

Therefore if $M = M_\odot$, as Donaghho first presumed, then $F = 804{,}000\ F_\odot$, as the professor asserted in his letter of Nov. 4.

But if we stipulate that Omos's tidal force on Poloda shall equal the Sun's force on the Earth, i.e., if $F/F_\odot = 1$, then from eq. (1),

$$\frac{M}{M_\odot} = \frac{1}{804{,}000} = 1.244 \times 10^{-6} .$$

$M_\odot$ is about $332{,}000 = 3.32 \times 10^5$ times the mass of the Earth, $m_\oplus$; hence we would have for the mass of Omos:

$$M = 1.244 \times 10^{-6} \times 3.32 \times 10^5 \quad m_\oplus = 0.413\ m_\oplus .$$

That is, for the tides on Poloda to be the same as the Sun's tides on Earth, Omos would have to have less than half of the Earth's mass ($m_\oplus = 5.974 \times 10^{27}$ grams).

The mass of a spherical body of radius r is given by $m = \frac{4\pi}{3} \rho r^3$ where ρ is the (average) density.

For the Earth, then, $m_\oplus = (4\pi/3)\,\rho_\oplus r_\oplus^{\,3}$, and for Omos, $M = (4\pi/3)\,\overline{\rho}\, R^3$, where I write R for the radius and $\overline{\rho}$ for the mean density. Donaghho here

* Incidentally, if either of the nearest planets to Poloda has the same diameter as Poloda (7000 miles), its apparent diameter to the Polodan observer is about 1.37 times that of the Moon seen from Earth. But its full disk would not be visible; it would look like the Moon at first or third quarter. Planets U and V would present almost full disks to P---but much smaller than the Moon's to us -- and the remaining planets would be in decreasingly gibbous phases the nearer they are to Poloda.

** Actually it is not the size of the central sun which is important in this problem, but its mass, i.e., the total quantity of matter it contains. A dense white dwarf star the size of the Earth may have the same tidal effect at a given distance as a huge Red Giant, many times as large as the Sun, consisting of highly rarified light gas.

assumes the case $\bar{\rho}$ = mean density of the Sun = 1.41 gm/cm^3 = $\rho_\odot/4$, so that

$$\frac{M}{m_\odot} = 0.413 = \frac{(4\pi/3)\bar{\rho}\, R^3}{(4\pi/3)\rho_\odot r_\odot^3} = \frac{(\rho_\odot/4)\, R^3}{\rho_\odot\, r_\odot^3} = \frac{1}{4}\left(\frac{R}{r_\odot}\right)^3 .$$

Therefore

$$\left(\frac{R}{r_\odot}\right)^3 = 4 \times 0.413 = 1.652,$$

or

$$R = 1.18\ r_\odot, \text{ approximately.}$$

That is, the radius (consequently the diameter) of Omos would have to be 18% (or roughly 20%, as Donaghho puts it in round figures) greater than that of our Earth.

I must point out here that these calculations compare Omos's tidal force on Poloda with the Sun's tidal force on the Earth. But actually, in our own case it is the Moon which contributes the major part---over two thirds---of the tide-raising force on our planet, and I wonder if this point escaped Prof. Donaghho's notice. The Moon's mass is roughly 1/27,000,000 of the Sun's, but it is about 388 times as close to us as the Sun; therefore the tidal force of the Moon on the Earth is $388^3/(27 \times 10^6) \approx 58.4/27 = 2.16$ times (roughly) as large as that of the Sun. Thus the Sun supplies only 1/3.16 of the total tidal force on the Earth. (We can safely neglect the effects of the other planets of our system.) Hence, if Omos is to produce tides on Poloda equal to the combined lunar and solar tides on Earth, its mass must be 3.16 times the figure derived above, or 1.3 $m_\odot$, approximately. With the same average density as our Sun, then, its diameter would be $\sqrt[3]{3.16} \approx 1.47$ times as large as previously found, or nearly 11,000 miles. (More exactly, if $M = 1.3\ m_\odot$ and $\bar{\rho} = \rho_\odot/4$, we find $R = 1.7325\ r_\odot$ very nearly. Since $r_\odot = 3960$ mi = 6373 km, we get for the radius of Omos R = 6860 mi or 11,040 km, in round numbers. The diameter of Omos is twice this, or 13,720 miles.) With this diameter, at a distance of 1,000,000 miles, it would present to a Polodan observer an apparent diameter of 1½ times that of our Sun seen from Earth.

The final letter in this correspondence was from Burroughs, dated Nov. 23, 1940, expressing relief that the tides on Poloda would not necessarily be as enormous and devastating as had first been suggested. Again he thanked Prof. Donaghho for his assistance, and concluded: "I am glad that you found fun in answering my queries. I find fun in the imaginings which prompt them; and I can appreciate, in a small way, the swell time God had in creating the Universe."

It is a bit surprising that Prof. Donaghho neglected to call ERB's attention to a couple of features of the Omos planetary system which I believe to pose more serious difficulties from the standpoint of scientific plausibility. The whole trouble, really, is that Burroughs made the system about a hundred times too small. His reason for this is obvious, of course. Clearly he had in mind to send his hero planet-hopping about the system, using a conveyance not very different from those familiar to us -- namely, an advanced form of aircraft. So he wanted the planets of Omos to be (astronomically speaking) a mere cat's-leap from one another and joined by an aerial pathway, so that a craft traveling at one or two thousand miles an hour would be able to make the trip from one world to the next in a matter of a few weeks at most. With eleven planets spaced at equal intervals around a circular orbit of radius 1,000,000 miles, the distance along this orbit from one planet to its neighbor on either side would be only

$$\frac{2\pi \times 1{,}000{,}000 \text{ mi}}{11} = 571{,}200 \text{ miles},$$

or somewhat more than twice the distance of the Moon from the Earth. The line-of-sight distance between the two planets, which is the chord joining them, is a shade shorter, amounting to 563,550 miles, center to center. In general, the straight-line distance from any planet to the n-th one from it in either direction around the orbit (n = any integer from 1 to 5) is

$$d = 2 \sin (n \times 16°22') \times 10^6 \text{ miles}.$$

Unfortunately the diminutive size of the Omos planetary system doesn't really help matters. In the first place, as Prof. Donaghho pointed out, the atmospheric ring around Omos along the common orbit of the planets would not remain. A gas expands indefinitely through a vacuum in all directions, unless it is restrained by very strong gravitational or other forces. Each planet in the system would be able to retain near its surface a thin layer of air, comparable to the Earth's atmosphere, providing the mean temperature of the gas is low enough so the average speed of its component molecules does not exceed the "velocity of escape" for the planet. The rest of the air-ring would disperse through intergalactic space. Between the planets would lie a near-perfect vacuum, not navigable by any form of aircraft. If Tangor is to travel from Poloda to any other planet by physical means (as opposed to the psychical phenomenon of his transport from Earth to Poloda), he must use a rocket or some more exotic type of vehicle.

But an even more awkward difficulty resides in the small mass of the central sun, Omos. As we saw above, if the ocean tides on Poloda are to be about like our own, the mass of Omos cannot be much greater than 1.3 times the mass of the Earth, or about 7.766×10^{27} grams. This is far too small for a body to be self-luminous at its surface and thus to qualify as a star, that is, as a "sun".*

Astronomers have long realized that a star must be formed when a sufficiently massive cloud of cold gas, several light years across in every direction, begins to contract under the mutual gravitational attractions of its own parts. As it shrinks, gradually assuming a spherical form, its density increases because the total mass remains constant.

* It must be said that nowadays astronomers are no longer quite sure just where to draw the line of distinction between "star" and "planet", for several invisible (because of great distance) and astronomically small size) bodies are known which apparently might be classed in either category equally well. I shall here retain the time-honored conception of a "star" as a body visibly luminous at its surface through the internal heat developed by its own gravitational compression.

But an increase in density results in an increase in its internal pressure; and this in turn is accompanied by a rise in temperature, especially in the central region where the density and pressure increments are most rapid. In time the core of the contracting cloud becomes hot enough to emit visible radiation, which helps to warm up the outer layers as it flows toward the surface; eventually, as the shrinking process goes on, the exterior surface itself of the now globular mass is hot enough to radiate visible light. At first this radiation is very faint and of dull red color, but with further contraction and heating of the mass, a growing proportion of the released energy is emitted in the shorter wavelengths. Slowly the surface color of the star climbs up the scale of frequencies into the orange, yellow, and white, at the same time becoming brighter and brighter. During this time the central temperature has risen into the range of some tens of millions of degrees Absolute.** At such temperatures the primary energy-source is no longer mere mechanical compression or ordinary chemical reactions, but processes of fission and fusion in the atomic nuclei themselves. Once these nuclear transformations become predominant, further contraction ceases -- and in proper circumstances even reverses for perhaps a hundred million years (i.e., the star expands into the Red Giant stage) -- until the nuclear fuel concerned in the particular type of reaction falls below a certain limit of abundance. Then the star contracts again, producing both nuclear and compressional heat until the central temperature is again so high as to initiate a new type of nuclear reaction chain.

But this whole business obviously depends on the mass of the original gas-cloud. If the mass is too small it may not begin to contract at all, or if it does, it may never manage to build up the high central pressure and temperature needed to make it shine at the surface.

The problem of calculating the internal conditions of a star is a complex and difficult one, involving a number of interdependent quantities which are not accessible to direct measurement. To get any sort of solution we must make some rather arbitrary assumptions, and our answers will vary with the hypotheses we adopt and the computational techniques we employ to make the problem tractable.

Although we know the average density of matter in Omos (adopting the Donaghho hypothesis $\bar{\rho} = 1.4 \times 10^{-24}$ gm/cm^3), we will have to have some idea of just how this matter is distributed inside the star's volume if we hope to determine pressures and temperatures within the Polodan sun, and here we will have to make some reasonable, but nonetheless arbitrary, hypothesis. The simplest assumption would be that Omos is homogeneous, that is, of uniform density $\bar{\rho}$ everywhere; but this does not seem physically likely. We suppose the star to be in the gaseous state, and it is large and massive enough that the gas in the central regions would be considerably compressed by the weight of the overlying layers, so it would be much more concentrated in the center than near the surface. We can certainly postulate that the distribution of matter in Omos is spherically symmetrical; i.e., in every direction from the center the density changes in exactly the same way with increasing distance. Obviously, in general the density must decrease from some maximum value ρ_0 at the center to zero at the surface, which marks the boundary of the body. I shall adopt what is probably the next simplest theory, that the density of Omos decreases uniformly outward from center to surface. Thus at any radial distance r from the center, in the range r = 0 to r = R, the density will be

$$\rho_r = \rho_0 \left(1 - \frac{r}{R}\right) . \qquad (0 \leqslant r \leqslant R) \qquad (2)$$

On this hypothesis the central density ρ_0 of Omos works out to four times the mean density $\bar{\rho}$, or $4 \times 1.4 \times 10^{-24}$ gm/cm^3 = 5.6×10^{-24} gm/cm^3, which is around twice the density of the heavier rocks in Earth's crust. The pressure at distance r from the center turns out to be

$$P_r = \frac{3}{7\pi} G \frac{M^2}{R^8}\left[4R^2\left(\frac{R^2 - r^2}{2}\right) - 7R\left(\frac{R^3 - r^3}{3}\right) + 3\left(\frac{R^4 - r^4}{4}\right)\right] \qquad \ldots(3)$$

Here $G = 6.67 \times 10^{-8}$ dyne cm^2/gm^2, $M = 7.766 \times 10^{27}$ gm, and $R = 1.10 \times 10^{9}$ cm. At the center itself ($r = 0$) eq. (3) becomes

$$P_0 = \frac{5}{4\pi} G \frac{M^2}{R^4} \qquad (4)$$

and amounts to a little over a million atmospheres or about 15,725,000 pounds per square inch.

The foregoing formulae give only the gas pressure due to gravitational compression. There is an additional pressure caused by radiation within the star, but in a body as small and light as Omos this is too little to be significant except perhaps in the center, and in any case cannot be found until we know the temperature, which itself depends primarily on the gas pressure.

By further assuming that the substance of Omos behaves everywhere as a perfect gas, it can be shown that the temperature T_r at radial distance r, due solely to gravitational pressure, is given in °K by

** Scientists measure absolute temperature on the Kelvin scale, so named after the famous British physicist who defined it, and denote such temperature by the symbol °K. The Kelvin scale uses the Centigrade degree as the unit of measurement, and starts at the Absolute Zero (0 °K), the temperature at which all molecular motion ceases. The Centigrade scale — also called Celsius after the Swedish astronomer who invented it — divides the temperature range between the freezing-point and the boiling-point of water (under standard atmospheric pressure) into 100 degrees, with the freezing point marked 0 °C. Our common household thermometers in America are calibrated on the Fahrenheit scale, devised by a German physician, on which the freezing point of water is 32° and the boiling point 212°. American engineers often speak of Rankine temperatures (°R)---named after a Scottish engineer -- which begin at the Absolute Zero like the Kelvin, but employ the Fahrenheit degree instead of the Centigrade. The relations among these various temperature scales are shown in the following table:

Absolute Zero = 0 °K = 0 °R = −273 °C = −459.6 °F.
Water freezes at 273 °K = 491.6 °R = 0 °C = 32 °F.
Water boils at 373 °K = 671.6 °R = 100 °C = 212° F.

If K, C, R, F denote Kelvin, Celsius (Centigrade), Rankine, and Fahrenheit temperatures respectively, then

$K = C + 273°$ or $C = K - 273°$ $(K \geqslant 0)$,
$R = F + 459.6°$ or $F = R - 459.6°$ $(R \geqslant 0)$,

$$\frac{C}{100} = \frac{F - 32°}{180} .$$

$$T_r = \frac{1}{12}\cdot\frac{G}{k}\,\mu_r\frac{M}{R^4}\,(5R^3 + 5R^2r - 19\,Rr^2 + 9r^3) \qquad (5)$$

in which k is the Boltzmann gas constant, giving the kinetic energy per °K for every free particle of the gas. It has the approximate value $k = 1.38 \times 10^{-16}$ erg/ °K. A "free particle" is a molecule, atom, ion, or electron which moves independently, unbound to any other. The symbol μ_r denotes the average mass per free particle in the gas at distance r -- in other words, all free particles at this distance are statistically assigned the same mass, whether they be electrons or complex molecules a million times heavier.

With r chosen at pleasure in the range 0 to R, all quantities on the right hand side of (5) are known except the mean particle-mass μ_r, and for the determination of this we must once more resort to hypothesis, this time in regard to the chemical constitution and internal structure of the star.

From studies of stellar spectra it is known that in the vast majority of cases most of a star's mass (from 50 to 90 percent) consists of hydrogen gas, with helium next in abundance; between them these two elements usually comprise over 99% of the star's matter. I will assume a similar composition for Omos: 50% hydrogen by weight and 50% helium. I make the further supposition that this matter is so distributed that near the surface of Omos it is pure molecular hydrogen, H_2, and in the center singly-charged helium and free electrons in equal numbers ($He^+ + e^-$). At both center and surface then, the average mass per free particle will be 2 atomic mass units (amu), or $2 \times 1.66 \times 10^{-24}$ gm = 3.32×10^{-24} gram. Finally I hypothecate that this holds good everywhere between center and surface, so that for anywhere in the star we can write $\mu_r = \mu = 2$ amu $= 3.32 \times 10^{-24}$ gram.*

Under this hypothesis, upon putting r = 0 in eq. (5) we find the temperature at the center of Omos to be

$$T_o = \frac{5}{12}\cdot\frac{G}{k}\,\mu\,\frac{M}{R} \qquad . \qquad (6)$$

On supplying the appropriate numerical values, we find that this yields

$$T_o = 4700\ ^\circ\text{K} = 8000\ ^\circ\text{F}.$$

Such a temperature is pitifully inadequate to initiate the hydrogen-fusion types of nuclear reactions which generate the energy of the stars, and which require temperatures on the order of several million °K. However, it is great enough to make Omos incandescent in its central regions, and is about equal to the surface temperature of the "coolish" orange-colored stars like Arcturus and Aldebaran.

In Fig. 3 I have plotted density, pressure, and temperature at any distance from the center of Omos as percentages of the values of these quantities at the center. Of particular interest is the fact that maximum temperature occurs not at the center, where density and pressure have their greatest values, but at about r = 0.15 R; here it has about 107% of its central value, or a little over 5000 °K.** At approximately r = 0.3 R the temperature has dropped back to the 4700° which it is at r = 0, and thereafter it falls off almost linearly to Absolute Zero at the star's surface (r = 1.0 R).

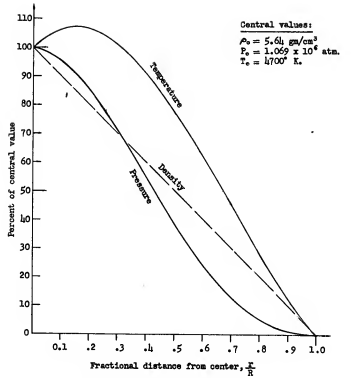


Fig. 3. Density, pressure, and temperature inside Omos, as functions of radial distance.

At this point I must again remind the reader that eqs. (3) and (5) -- which are represented graphically by the pressure and temperature curves in Fig. 3 -- are predicated on the assumption that gravitational compression is the sole origin of these quantities. Actually, the heat thus generated at any place in the star does not remain there indefinitely, but leaks away by convection, conduction, and radiation to adjacent cooler regions, at a rate depending upon temperature differences, thermal conductivity, optical opacity, and heat-absorbing capacity of the substance concerned. (You can see that computing the rate of heat-transfer within a star calls for still more guessing!) The result is that the outermost layers of the star acquire some heat from the interior, and therefore the temperature of Omos at the surface is not in fact down to Absolute Zero. Without attempting a quantitative examination of this very difficult problem, we can say that for at least several hundred or a thousand miles below the surface the star's gases are too cool to emit any visible light. Possibly enough radiation will come through from the deeper layers to render the "star" faintly visible from outside as a dull, very deep red ball. But certainly the amount of energy escaping into space is hopelessly insufficient to

* If we suppose one or two percent of the star's mass to consist of heavier elements (e.g. lithium, carbon, oxygen, etc.) distributed more or less uniformly through its volume, the mean free-particle mass μ will be very slightly greater than 2 amu, but not enough to make any significant difference in the value of T.

** However, the product $T_r \rho_r$, which measures the thermal energy per unit volume, decreases continuously from center to surface.

provide perceptible light and heat to Omos's family of planets — their own surface temperatures will be not far above the Absolute Zero, and any form of life upon them is quite out of the question.

Of course, we could scout around for some other possible means of heat-production in Omos. In the 18th and 19th centuries, before atomic energy was dreamed of, men endeavored to explain the Sun's radiation - output on the basis of chemical reactions, infalling meteoric matter from interstellar space, and gravitational contraction. None of these suggestions stood up to critical examination. For instance, it is easily found that if our Sun -- 257,500 times as massive as Omos — consisted entirely of pure anthracite coal and just enough oxygen to insure complete combustion, it could maintain its present rate of energy- output for only 1600 years. Then it would be a dead cinder, cooling into frigid, black invisibility in another couple of thousand years. Under the same circumstances, Omos's career as a "sun" would last less than a week. (Divide 1600 years by 257,500 to find out for how long Omos could shine as brightly as our Sun, assuming the same coal - and - oxygen composition.)

The meteoric infall theory rests on the idea that enormous numbers of tiny meteoroids, coming from the vast spaces outside the solar system, enter the Sun's atmosphere and are burned up by friction, their kinetic energy being converted into light and heat which the Sun radiates back out into space. Again it is easy to figure how fast these particles are moving when they plunge into the solar surface under the Sun's gravitational pull, and hence how much meteoric mass must enter the Sun in unit time to maintain the Sun's known rate of energy production. The catch is that according to these requirements the earth itself would be bombarded by about 20 million tons of meteoric matter per day, which is fifteen or twenty thousand times as much as observation indicates to be the case. For Omos the situation would be much worse, for because of Omos's small mass the incoming meteoroids would be moving much less swiftly, and therefore a much larger mass of them must penetrate the star's surface per second to produce as much heat and light as our Sun puts out (per unit of surface area) in the same time. The rain of meteors on Poloda and the other planets would be almost as great as on Omos itself, with the result that their own atmospheres would be heated to incandescence or very nearly so — Poloda and its fellow planets would themselves be "stars".

The Gravitational Contraction theory is a development of ideas similar to those we discussed earlier. It asks how fast a star must shrink in order to convert the gravitational potential energy of its material into a stipulated amount of radiant energy per second, and for how long such shrinkage can continue before the star's substance reaches a stage of condensation beyond which it cannot go. Calculation indicates that in order for Omos to supply Poloda with as much radiant energy per unit time as we receive from the Sun, its radius must at present be diminishing at the rate of over four meters per hour. At this rate Omos would contract to a point in a bit less than three hundred earthly years. However, as the star becomes smaller and more compact the necessary rate of gravitational contraction to maintain a given energy - production decreases markedly, and we find that 300 years from now Omos would still have half its present diameter. On the other hand, if Omos always furnished Poloda with this same flux of radiation, then in the past it must have been shrinking at fantastic -- nay, impossible---rates; its entire past existence as a star can hardly exceed 250 earthly years. It is doubtful if even the first primitive unicellular organisms could have appeared on Poloda in so fleeting a time, let alone a highly developed civilization by an advanced form of life. So gravitational contraction too must be ruled out as an appropriate energy-source for Omos.

Possibly there is a chance of saving Omos by considering it to be a white dwarf star, for these abnormal objects present many problems at whose answers we can only guess. Presumably they are once - normal suns which have exhausted all their hydrogen fuel and are now slowly sinking through their last several - billion - years-long come toward utter blackness and death. They are of planetary size -- the smallest have diameters less than the Earth's; the largest are perhaps 50,000 miles through — but their masses are generally not much less than the Sun's (a few are suspected to be heavier than the Sun); consequently they must be of enormous densities and their constituent matter does not exist as definitely structured atoms, but as naked atomic nuclei and free electrons, mixed and crowded together in a chaotic welter. Yet, although they seem to have no internal sources for the generation of energy and are apparently merely cooling down by radiating the heat they contained when hydrogen - fusion ceased, they have very high surface temperatures as indicated by their white color.

We don't really know what is the smallest mass that a white dwarf can have. One is known with a mass of 43% of the Sun's, but this is still over 100,000 times the mass of Omos. It does not seem possible that a body with an initial mass much less than the Sun's could ever reach that stage of prodigious compaction which we find in the white dwarfs. In this connection, however, I might offer a suggestion. Suppose that some time in the past there existed a star as massive as the Sun or more so, which passed through its normal evolutionary course and declined into the white dwarf stage — small, heavy, tremendously dense — and then, in a final death-convulsion, exploded into thousands of smaller fragments, most of them with masses of planetary order. Omos could be one of these fragments, as dense and nearly as hot as the parent star from which it was born. (This would necessitate a drastic downward revision of our computation of Omos's diameter.) The other, similar bits of the parent star would be scattered around space in the same general vicinity, thereby providing a starry night sky for Poloda not too unlike our own.

There are some moot points about this idea, but perhaps it will provide an escape from the dilemma that Omos's small mass poses.

Had Burroughs placed Poloda and the other planets at 100,000,000 miles from Omos instead of 1,000,000, he could have made Omos itself a normal star very much like our Sun. It could have an adequately long past history and an adequately long future, shining with brilliant yellow - white radiance and supplying ample warmth and illumination to its attendant worlds, yet raising no disastrous tides in the Polodan seas.

A second feature of the Omos system about which I feel some qualms is the question of the dynamical stability of the planets in their common orbit. This is an instance of the classic, generally un-

solved "many-body problem" in gravitation theory, so I can attempt only the most tentative and over-simplified approach to it.

Professor Donaghho mentioned in his first letter of reply to ERB that if Omos's eleven planets are to remain equispaced around their common orbit they must all have exactly equal masses, for the orbital velocity is to some extent dependent on the planet's own mass as well as that of the central sun. It can be shown that if a body of mass m moves in a circular orbit of radius D around the center of another mass M, the speed of m in its path will be

$$v = \sqrt{\frac{G(M+m)}{D}} \quad .$$

Hence if any two of Omos's planets are to have equal orbital velocities, and thus remain always the same distance apart, then we must have $M + m_1 = M + m_2$ or $m_1 = m_2$, where we let m_1 and m_2 be the masses of the two planets, M = mass of Omos, and D = radius of the planets' common orbit. The chance of eleven planets in a single system being all of precisely the same mass is, of course, infinitesimal. Must we then dismiss the Omos system as impossible on this ground alone?

Not necessarily -- but we will have to introduce a slight modification: we can assume that the various Omosian planets, while nearly of the same mass are not exactly so, and move not exactly along the same track but along closely neighboring orbits such that they all require exactly the same time to make a complete circuit around Omos. Let all these orbits be circular. If v is the orbital speed of a planet of mass m moving in a circle of radius D, the time required for a single revolution (i.e., the length of the planet's "year") is

$$t = \frac{2\pi D}{v} = \frac{2\pi}{\sqrt{G}} \sqrt{\frac{D^3}{M+m}} \quad . \qquad (7)$$

Take two planets of masses m_1, m_2 moving in orbits of respective radii D_1, D_2, with periods t_1, t_2. For the two planets to remain in the same relative positions to each other we must have $t_1 = t_2$, which implies

$$\frac{D_1^3}{M+m_1} = \frac{D_2^3}{M+m_2}$$

or

$$D_2 = D_1 \sqrt[3]{\frac{M+m_2}{M+m_1}} \quad . \qquad (8)$$

From Burroughs' general description of Poloda it is evident that this planet's mass cannot differ enormously from the Earth's, and it seems the same is true of the other planets of the system. Also we found that $M = 1.3\ m_\oplus$, so it is clear that m_1 and m_2 in the foregoing equation are of the same order of magnitude as M. For example, if we write $m_1 = 0.6\ M$ and $m_2 = 0.75\ M$, we get in (8):

$$D_2 = D_1 \sqrt[3]{\frac{1.75}{1.6}} = D_1 \sqrt[3]{1.09375} \approx 1.03\ D_1 ;$$

that is, planet m_2 must move in an orbit whose radius is about 3% greater than that of planet m_1. Since D_1 is in the neighborhood of one million miles, the second planet moves in an orbit whose radius is about 30,000 miles greater. Both planets take the same time to circle once around Omos, thus remaining always at the same distance from each other, yet the mass of the outer planet is 25% greater than that of the inner. We see therefore that it is not a stringent requirement for all the planets of the Omosian system to have precisely equal masses in order to remain at fixed relative positions, providing we separate their individual orbits by a few hundreds or a few thousands of miles -- a liberty we may surely allow ourselves.

However, the foregoing considerations take no account of the really difficult part of the problem: the effect of the various planets' gravitational pulls on one another.

To simplify the situation to the limit, consider three equimassive planets A, B, C spaced at equal intervals on a common circular orbit, along which they move as indicated by the arrowhead in Fig. 4. Let F_{AB} be the force with which A pulls on B; this force acts in the direction from B to A along the chord AB. Now F_{AB} can be resolved into two mutually perpendicular components, one of which is tangent to the orbit at B and points in the direction of B's motion, while the other is perpendicular to the orbit at B and points radially inward toward the center of the orbit, i..e, toward Omos. The relative magnitudes of F_{AB} and its two components are proportional to the sides of the right triangle AB'B in Fig. 4; that is

$$\frac{F_{AB}}{AB} = \frac{F_{AB(t)}}{AB'} = \frac{F_{AB(r)}}{BB'} \quad , \qquad (9)$$

where the parenthetical subscripts (t) and (r) refer to the tangential and the radial components of F_{AB} respectively. The force-component $F_{AB(r)}$ acts to pull planet B in toward the central sun; $F_{AB(t)}$ on the other hand serves to accelerate B in its

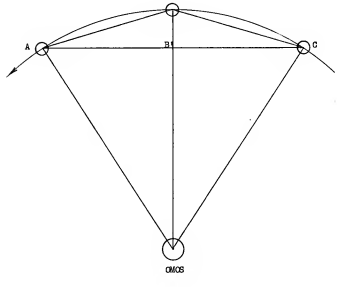


Fig. 4

path, i.e., to increase B's orbital velocity. But if B speeds up in its path then the centrifugal force on the planet becomes greater, which tends to raise the planet into a higher (larger) orbit, and thus to some extent counteracts the radially-inward force $F_{AB(r)}$.

Now regard the third planet, C. It pulls on B with a force F_{CB} along the chord from B to C. As $m_C = m_A$ and the distance BC = AB, we will have $F_{CB} = F_{AB}$. The force F_{CB} can also be resolved into tangential and radial components $F_{CB(t)}$ and $F_{CB(r)}$, which by the geometrical symmetry of the configuration will be equal respectively to $F_{AB(t)}$ and $F_{AB(r)}$. But whereas $F_{AB(t)}$ acts tangentially forward on B, $F_{CB(t)}$ acts tangentially backward; that is, $F_{CB(t)} = -F_{AB(t)}$. Thus the tangential force on B due to C just nullifies the tangential force on B due to A; where A tends to speed up B in its orbit, C tends equally to slow B down. Hence B keeps its orbital velocity unchanged. However, the radial component $F_{CB(r)}$ acts on B in the same direction as the radial force $F_{AB(r)}$ due to planet A --- toward the center of the orbit -- so the net effect of planets A and C is to produce on B an unbalanced radially-inward force $F_{(r)} = F_{AB(r)} + F_{CB(r)}$ which must pull B in toward the central sun.

The effect of this inward pull on B by the planets A and C is as if the mass of the central body (Omos) had been increased somewhat. From geometrical considerations and Newton's law of gravitation it is readily found that the radial force on B, due to Omos and the two planets A and C, amounts to

$$F = \frac{G\,m}{D^2}\left(M + \tfrac{1}{2}\,m\,\csc\frac{\Phi}{2}\right),$$

in which m denotes the mass of any one planet and Φ the angular separation between any two consecutive planets. In effect we have simply increased the mass of Omos by the amount (m/2) cosecant (Φ/2).

With eleven equally-massive planets spaced at regular intervals Φ around the orbit, each planet in turn can be regarded as the middle one of three, as we have just treated B. So whatever results are found for one planet will also apply to each of the others.

Let's go back to Fig. 2 and take Poloda (planet P) as the one whose motion we are studying. The remaining ten planets can be divided into five pairs as follows: (Q and Z), (R and Y), (S and X), (T and W), (U and V). The two members of each pair are at equal distances from Poloda and are symmetrically placed with respect to the line Poloda - Omos. Assuming that each of the eleven planets has the same mass m, the tangential forces which each pair exercises on Poloda will nullify each other and we will be left with five pairs of radial-inward forces. Taking account of the different distances of the five planet-pairs from Poloda, we find after a bit of arithmetic that the total centripetal force acting on Poloda amounts to

$$F = \frac{G\,m}{D^2}\,(M + 4.4153\ m). \qquad (10)$$

This is the force which would act on Poloda if the other ten planets vanished and the mass of Omos were increased from M to the quantity in parentheses. Let us designate this quantity by M' and call it the "relative mass" of Omos. To find the length of Poloda's year we now return to eq. (7), replacing the mass M by the relative mass M' of Omos, so that

$$t = \frac{2\pi}{\sqrt{G}}\sqrt{\frac{D^3}{M' + m}} = \frac{2\pi}{\sqrt{G}}\sqrt{\frac{D^3}{M + 5.4153\ m}}. \qquad (11)$$

This is the common period of all the planets, since we are presuming them to be of equal masses and moving in exactly the same circular orbit.

To evaluate (11) we need to establish a value for m, say in terms of the Earth's mass $m_\oplus$, since we have already given M in such terms. From the Tangor stories it is apparent that the force of gravity on Poloda is about the same as on Earth; if we suppose it to be exactly the same we will have

$$\frac{G\,m}{r^2} = \frac{G\,m_\oplus}{r_\oplus^{\,2}},$$

in which m represents the mass and r the radius of Poloda, with $m_\oplus$ and $r_\oplus$ the corresponding quantities for the Earth. Consequently $m = m_\oplus (r/r_\oplus)^2$. According to the chart of Poloda given on the end-papers of TALES OF THREE PLANETS, the diameter of Poloda is 7000 miles. That of Earth is 7920 miles. The radii of the two planets are in the same ratio as their diameters, so $r/r_\oplus = 7000/7920 = 0.884$, and $m = (0.884)^2\, m_\oplus = 0.7815\ m_\oplus$, roughly. Putting $M = 1.3\ m_\oplus$, we have for the denominator under the radical sign in (11), $M + 5.4153\ m = 5.532\ m_\oplus$.

We set up a comparison case with the Earth - Sun system. Since $M_\odot = 3.32 \times 10^5\ m_\oplus$, the quantity $M_\odot + m_\oplus$ is not, for our purposes, significantly different from $M_\odot$ itself. But $D_\odot$, the distance between Earth and Sun, is 93 D. Therefore, letting $t_\oplus$ = Earth's orbital period = 1 year, we have from eq. (11):

$$\frac{t}{t_\oplus} = \sqrt{\frac{D^3}{5.532\ m_\oplus}} \cdot \frac{3.32 \times 10^5\ m_\oplus}{8.0\mathrm{i} \times 10^5\ D^3} \approx 0.273.$$

That is, t = 0.273 year = 99.7 days, approximately.

The Poloda year thus comes out to about 100 earthly days in length -- and this creates another difficulty. In BEYOND THE FARTHEST STAR, p. 41, we are informed that there are 300 days in a Poloda year. Presumably this means Poloda days, which would imply that the Poloda day (i.e., a complete axial rotation) is approximately 8 hours in length: four hours of daylight followed by four hours of night. But this is certainly not the impression we gather from the stories, which seem to imply that the Poloda day does not differ greatly from our own. Again, if one Poloda year = 0.273 Earth-year, then 1 Earth-year = 3.663 Poloda years, and the distance of 450,000 Earthly light years (adopting ERB's figure) between our system and Omos must amount to very nearly 1,650,000 Poloda light years rather than 547,500 as stated on page 41 of STAR.

On the other hand, if we accept that 450,000 Earth-years = 547,500 Poloda years, or 1 Poloda year = 0.882 Earth-year, then the ratio of D, the radius of Poloda's orbit, to $D_\oplus$, the radius of the Earth's orbit, will be given by

$$\frac{D}{D_\oplus} = \sqrt[3]{\frac{5.532\ m_\oplus}{3.32 \times 10^5\ m_\oplus}} \times .882^2 \approx 0.0506,$$

which makes D just about 4,700,000 miles.

The whole problem becomes much more complicated, of course, if the Omosian planets are not all of equal mass and moving in precisely the same orbit. However, the foregoing figures indicate the general neighborhood of the results that should be obtained

if all the individual planetary masses were known. I cannot say whether the system would be stable; I see no obvious argument against it. But we see again that Burroughs made the whole Omos system much too small.

Yet there is still one point we should not forget. When Tangor was taught the Unisan tongue, he was no doubt shown some sort of measuring-rod which he judged to be, let's say, six feet long, and was given the Polodan name for this length-unit. On the basis of this observation he built up all his conceptions of size relating to Poloda and the Omos planetary system. But when Tangor was transplanted to Poloda he didn't take his earthly body along, so he had no way of ascertaining if that "six foot" rod was really about as long as the physical body he had worn on Earth. Maybe everything in the Omos system, including Tangor himself, is a hundred times as big as he thinks . . .

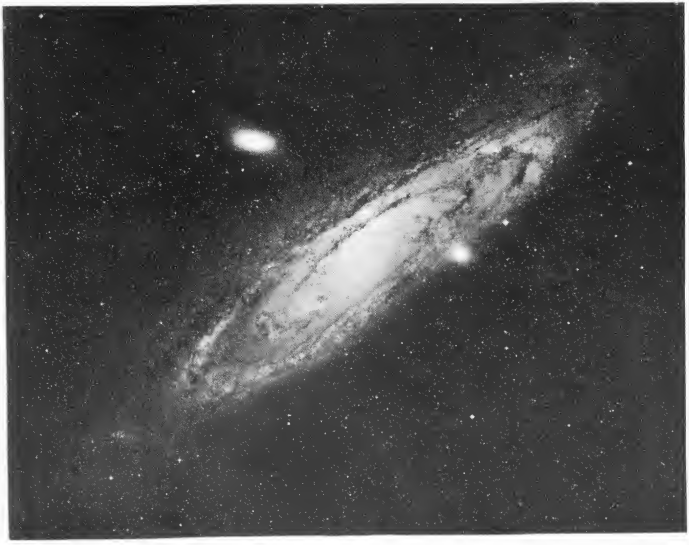


Plate 1. The great spiral galaxy in Andromeda, M(essier) 31, or NGC 224. This vast system of stars, nebulae, globular clusters and dust clouds is one of our two nearest neighboring galaxies (other than the two Magellanic Clouds, which are small, irregular satellite galaxies to our own), being estimated as from 2 to 2½ million light years distant. In size and mass it is comparable to our own galaxy, though there are still some uncertainties in the measures. This picture, taken with the 48-inch Schmidt telescope on Palomar Mountain, California, shows approximately how our galaxy would appear to an observer on Poloda, save that it would be much less bright, and the thickly-sprinkled foreground stars would be absent. Photo reproduced by permission of Mt. Wilson and Palomar Observatories.

Her Favorite Uncle Was Tarzan's 'Dad'

Mrs. Carlton D. McKenzie Sr. . . . Tarzan Wasn't Her Uncle's First

By HARRIET DOAN
Observer Staff Writer

Stories about Edgar Rice Burroughs report that he had "never written a word" until 1912, when he turned out "Under the Moon of Mars," sent it to All-Story magazine and collected $400.

But a Charlotte resident, Mrs. Carlton D. McKenzie Sr., has proof that his writing career started much earlier.

She has three small handmade books composed, lettered and illustrated by the man whose "Tarzan of the Apes" would become one of the most popular and perilous characters of all time.

Her Uncle Ed made them to entertain his little niece around the turn of the century, when he was the gold-dredging with his brother Harry, Mrs. McKenzie's father, in the rugged Northwest.

The books show the same imagination and liveliness their creator would display later in his published work. He was about 25 at the time, an impractical dreamer with a droll sense of humor.

"I adored him," Mrs. McKenzie said at her home on tree-shaded Maryland Avenue as she leafed through a neat collection of yellowed photographs from the time. "He was my favorite uncle. He was always full of jokes and nonsense. And he had a twinkle in his eye that was . . . well, it was just different."

Mrs. McKenzie, who came to Charlotte three years ago from Michigan, is a small, alert grandmother with blue eyes and short, silvery hair.

When her uncle was producing his first books for her personal pleasure, she was a curly - haired child spending summers on the Snake River in southwest Idaho.

Her mother would take the two children, Mary Evelyn ("Evvie" and sometimes "Marie") and her brother "Tubby" (her childish version of Studley), from Chicago, their winter home, by train.

The first of Mrs. McKenzie's cherished books is called "Snake River Cotton-Tail Tales," the cover embellished with two cotton - tail bunnies who continue through the book.

Inside, neatly lettered and signed with a flourish, is the inscription:

THYS BOOK IS DEDICATED AND GIVEN TO EVELYN BY HER UNCLE ED 1900
Author's Autographic Edition
Ed R. Burroughs
Limited To One Copy
Of Which This Is No. 1

The young author used his imagination to play on words, but for his lively water color illustrations he took his models from the outdoor life around him.

Facing the page illustration of an angry bull rushing after a man barely escaping by somersaulting the fence is the drawing of a bullrush (cattail) and the following poem:

"A bull rush in the meadow,
"As the blue-jay on the wing,
"Universe me," said the rabbit,
"That we'll see an early spring."

Facing a page on which the bunnies watch a cow slipping down a slope is this rhyme:

"When I see the little cow-slip,"
Said the Rabbit to his chum,
"I can read the story plainly
"That another Fall has come."

Opposite a ranch house scene with farm animals and barnyard fowls is:

"That great big ugly eggplant, me,
"Just bit me as the leg."
"That is a hen yan foolish child."
"Well I saw her lay an egg."

Another book her uncle put together is "Grandma Burroughs' Cook Book," also illustrated in color and handlettered, inscribed (with old-fashioned long s's like f's), for "Mifrefs Evelyn, Christmas 1901."

The recipes are subdivided for a child, some of the measurements as small they are given in gills, dews and pinches. They seem quite accurate.

"They must have been, for I remember making biscuits when I was 5 or 6 and getting praised for it," Mrs. McKenzie said with a laugh. There are recipes for cookies, fried chicken (two pieces), and other goodies, including "white-food cake, illustrated with performing angels, one of them startled by a star bursting off her halo.

A third little book by the unknown author is a kind of family book, rhymed stories with jokes referring to the various personages of the household.

It also gives advice to Mistress Evelyn on the kind of a man a girl should seek to marry — not a Dude or a Ward Heeler or a "Hahvaahd Boy," but a real Yale Man. (Harry was Yale '85.)

The book shows the same playful wit as the others, and the pen-and-ink drawings exaggerate the costumes of the times, including the women's big leg-o-mutton sleeves.

Ed liked women of generous proportions, Mrs. McKenzie said, and the illustrations bear her out. They are highly expressive character sketches. "He never had a drawing lesson," his niece said, "and he never studied writing."

Mrs. McKenzie's father, Henry Studley Burroughs (Harry), grew up in Chicago. He liked the outdoors and went first into cattle ranching, adding the gold-mining Uncle Ed, the youngest of four brothers, worked intermittently in both.

'If I Couldn't Write A Better . . . '

"He'd flunked out of a half-dozen schools," Mrs. McKenzie said. "He ran away and lied about his age to join the Army in the Southwest, when there was still trouble with Mexico. He got pretty homesick and Grandfather got him out when he thought he'd had enough of it to learn a lesson. He went from one thing to another . . . had a stationery business for a while and flubbed that. He was a dreamer, not practical at all."

He was selling pencil-sharpeners for a tuving when he first talked himself into writing. By that time he had a wife and a daughter — he would have three children.

"He threw down an All-Story magazine in disgust one day and said, 'If I couldn't write a better story than that I'd go jump in the lake,'" Mrs. McKenzie recalled. "His wife said, 'Well, if you can, why don't you?' And he did."

The $400 check he got for his first professional effort induced him to write a longer story, "Tarzan of the Apes," which brought him $700 from All-Story.

"Uncle Ed had a lot of faith in my father's judgment — they were very close — and he asked him if he should give up his job to write," Mrs. McKenzie said. "My father advised against it. Fortunately Uncle Ed didn't take that advice.

"He sold every story he ever wrote, except one that the publisher said was 'too gory.'"

He expanded the Tarzan novella into his first book, with the same title. Mrs. McKenzie remembers that she and her mother read the longhand manuscript aloud in the evenings and were "very much intrigued with the story."

The improvident dreamer was on his way to becoming a millionaire, largely through the Tarzan books and movies. With fond memories of outdoor life in Idaho, Burroughs bought a California ranch, which he named Tarzana, and a Malibu Beach home. When he turned Tarzana into a development, he moved to the coast. In World War II, he spent some time as a war correspondent in the Pacific. In the late 40s, a series of heart attacks put him in a wheel chair.

Mrs. McKenzie, who had visited him in California before, took her first plane trip to see him in his final illness, when they talked over old times on the Snake River. He died in March 1950. His first biography, "The Big Swingers" by Robert Fenton, is scheduled for publication Feb. 28, and his niece has contributed some material for it.

He Never Took Results Seriously

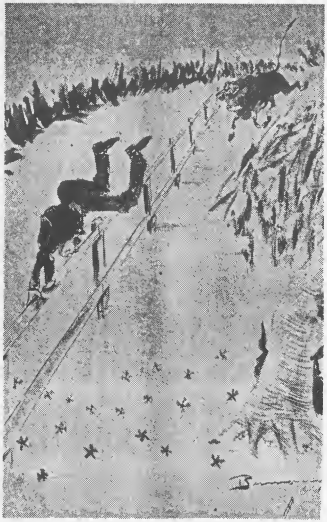
Mrs. McKenzie's husband, who was in the milling business in Michigan, died in 1960. She came here with a double purpose: to escape the northern winters and to be near her son, C. D. McKenzie Jr. of Interstate Milling Co., and his family, Peggy and the three girls.

"I always loved the South," Mrs. McKenzie said. "After all, I have Southern blood." Her mother, from Shreveport, La., set out in find fame on the New York stage but stopped in Chicago to visit the Burranghs family and found romance instead.

Edgar Rice Burroughs, his niece reported, worked at his writing — he learned to compose on the typewriter and put in his daily stint — but he never took the results very seriously. "They're not anything I'm proud of," he would say.

But he took his fans seriously. When young Mac, Mrs. McKenzie's son, took his Tarzan books to be autographed, the writer was delighted. He filled out the collection, and his great-nephew has a complete set of the volumes, autographed with the same flourishes that embellish the much-read, patched-together books he produced by hand to make a little girl laugh.

When Mrs. McKenzie Was A Child . . . This Picture Was Taken When She Was 3 Years Old



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"That is a hen you
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"Well I saw her
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JOHN
CELARDO

AD-LIBS

The latter part of April I completed a lecture tour of the Southeastern states which has taken the better part of two years. This publication and The Gridley Wave suffered an upset schedule due to the tour mentioned, but all was not lost and the BB's will reap some of the benefits of this extended jaunt. I had the pleasure of meeting many fans and fellow Bibliophiles and information pertinent to BB projects was accumulated along the way. Long talks and interviews were enjoyed with Samuel Cahan, who illustrated ERB yarns in Argosy, and Mrs. Carlton McKenzie Sr, ERB's niece, who was kind enough to furnish us with material for at least two articles, one which will be a feature about her brother, Studley O. Burroughs. One of the highlights of the tour came during Thanksgiving holidays 1965 when Rita joined me in Florida. We had a long visit with Mr. & Mrs. Joseph C. Pohler, whom you may know better as Gene Pollar. Mr. Pohler's interview is scheduled for the BB and he cleared up some of the mystery about his career and THE REVENGE OF TARZAN. I have now had the pleasure of meeting all of the portrayers of TARZAN on the silent screen and the interviews and information these people have given me will be available to BB's in part one of A PICTORIAL HISTORY OF THE TARZAN FILMS: THE GOLDEN SILENTS. Visits with Will F. Jenkins (Murray Leinster) and Theodore Roscoe (boy, those guys sure can write!) also helped break the monotony of mile after mile after mile. Spent a week on Merritt Island as they were preparing a launch at Cape Kennedy...but had to leave just a day before a manned blastoff. Oh, well, I still recall vividly the blastoff from that little island off the west coast of Lower California. Quite unusual in those days.

My next tour will find me right around home, which should mean a stepped up BB schedule... providing members continue to pay their dues. The next BB should make all you art lovers drool...it is all about and chuck full of... FRANK FRAZETTA!

Glenn Lord just informed us that THE GIRL FROM HOLLYWOOD began serialization in the November 1927 issue of THE HOUSEHOLD JOURNAL.

The news about Dum-Dum 67 is in GW #23. It should be going along for the ride with this issue of the BB...and speaking of riders... what do you think of Larry Hanks scene from A PRINCESS OF MARS? It is sent as a rider (some call 'em flyers but we're trying to do town to earth by not sending this air mail), so those who wish to can frame it. Yeah, we know, but the BB's can't afford it...anyway, we like to provide good clean fun and games, too...soooo don't write "guest editorials", gang, just get out your box of crayons and enjoy yourself... funfunfunfun!!!!!!!!!

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